INSECTS OF MICRONESIA
Coleoptera: Coccinellidae

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INTRODUCTION

The material upon which this report is based was loaned to me for study by Bernice P. Bishop Museum (BISHOP), U. S. National Museum (US), the Chicago Museum of Natural History (CM), the Museum of Comparative Zoology, Harvard (MCZ), and Kyushu University (KU). Except for Ocean, Nauru, and Kusaie, all of the major islands or island groups of Micronesia are represented in the collections. The greater part of the nearly 2,000 specimens available were collected by J. W. Beardsley, G. E. Bohart, R. M. Bohart, H. S. Dybas, J. L. Gressitt, N. L. H. Krauss, and R. G. Oakley. Smaller lots were taken by P. A. Adams, ... Allen, R. H. Baker, R. E. Bertram, E. S. Brown, E. H. Bryan, Jr., R. Catala, W. W. Cantelo, C. F. Clagg, ... Corwin, H. S. Ducoff, ... Edgar, T. Esaki, E. J. Ford, Jr., F. R. Fosberg, D. T. Fullaway, R. J. Goss, F. C. Hadden, E. Hagen, ... Haringa, ... Hutzel, Y. Kondo, I. Kono, W. H. Lange, D. B. Langford, I. La Rivers, B. McDaniel, K. L. Maehler, D. Matusita, A. R. Mead, W. C. Mitchell, E. T. Moul, R. P. Owen, G. D. Peterson, R. W. L. Potts, C. W. Sabrosky, S. Sakagami, F. M. Snyder, J. R. Stuntz, O. H. Swezey, J. A. Tenorio, H. K. Townes, L. D. Tuthill, S. Uchiyama, R. L. Usinger, H. S. Wallace, K. Yasumatsu, and S. Yoshimura. To all whose contributions have made this study possible I wish to express my thanks.

The coccinellid fauna of Micronesia is decidedly mixed as to origin. Part of it is probably endemic, a part is introduction from Asia, and a small part introduction from the New World. Of the endemic species, the most noteworthy are the eight species of *Pharellus*, all new to science, and the species *Daulis boulardi* Mulsant 1850, which I have tentatively assigned to the genus

[1] This represents in part, Results of Professor T. Esaki's Micronesian Expeditions (1936-1940), No. 126.

Coelophora. The introductions from the New World have, in part, been made intentionally, to wit: *Azya orbigera* Mulsant, *A. trinitatis* Marshall, and *Cryptognatha nodiceps* Marshall. *Olla abdominalis* (Say), *Scymnus* (*Pullus*) *loewii* Mulsant, and *Psyllobora* have apparently come into the area with commerce. Of the Asiatic introductions, one at least is recent, the injurious *Epilachna philippinensis* Dieke which, because of its destructive attacks on solanaceous plants, calls immediate attention to its presence. Three species, belonging to as many genera, which are of doubtful origin are treated in the Appendix.

As used in this paper, the term "genitalia" refers to those parts of the genital system that are resistant to the destructive effects of cold 10 percent potassium hydroxide. My own experience indicates that there is less distortion and much less chance of displacement of parts if the whole abdomen is allowed to remain quietly in the cold solution for 12 to 24 hours. This especially applies to the female. While the receptaculum seminis alone gives some indication of the relationships of the species, much more can be learned from the length and character of the sperm duct, the presence or absence of the infundibulum, and, occasionally, from the structure of the bursa copulatrix.

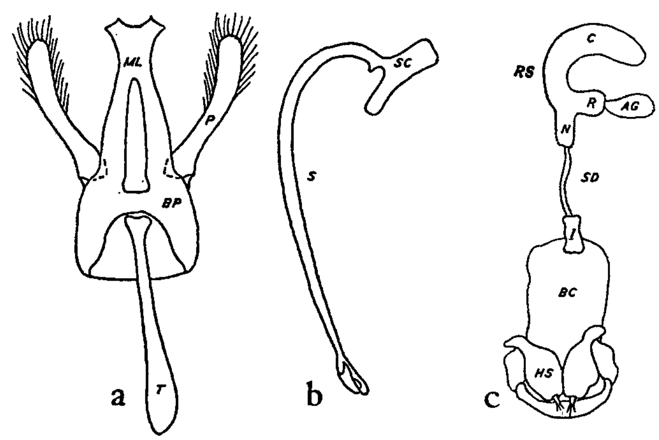


FIGURE 1.—Male and female genitalia (schematic): **a**, tegmen (BP, basal piece, ML, medium lobe, P, paramere, T, trabes); **b**, sipho (S, sipho, SC, siphonal capsule); **c**, female (AG, accessory gland, BC, bursa copulatrix, C, cornu, HS, hemisternite, I, infundibulum, N, nodulus, R, ramus, RS, receptaculum seminis, SD, sperm duct).

The terminology of the various parts of the sclerotized structure of the internal genitalia adopted in this paper is that of Dobzhansky, following Verhoeff. One change has been made in the use of "penis." By definition, the penis is the intromittant organ, bearing at its apex the terminal orifice and at its base the insertion of the vas deferens which has its origin in the testes. Therefore the sipho of Coccinellidae is the true penis and for the part designated as

"penis" by Dobzhansky I have substituted median lobe, following Timberlake.

In the female, the genital plates or hemisternites in some groups do offer certain characters of use in classification and have, by some writers in the past, been dignified by the term "female genitalia." These together form the ninth abdominal sternite and in the Coccinellidae rarely can be used to separate related species. They are probably most useful for this purpose in the Epilachninae. There are several general types found in the family, four of which are illustrated in figure 2. The styli are usually present but in a few cases are apparently absent. The more common types are the blade and handle (figure 2, *b*) of the coccinellines and synonychines and the elongate triangular (figure 2, *c*) of the scymnines. Hemisternites of this type appear to function as an

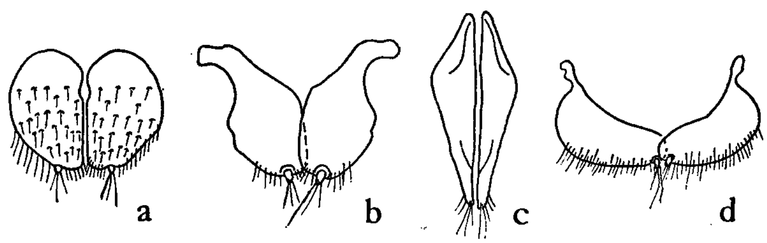


FIGURE 2.—Types of hemisternites: a, *Epilachna philippinensis;* b, *Coccinella 7-punctata;* c, *Cryptolaemus montrouzieri*; d, *Cryptogonus orbiculus.*

ovipositor. A third type (figure 2, *a*), rounded or rounded triangular is, so far as I know, restricted to the Epilachninae. A fourth type (figure 2, *d*), apparently a modification of the blade and handle, seems to lead into the transverse, more or less semicircular type of the hyperaspines, a group not represented in the Micronesian fauna.

ACKNOWLEDGMENTS

The United States Office of Naval Research, the Pacific Science Board (National Research Council), the National Science Foundation, and Bernice P. Bishop Museum have made this survey and publication of the results possible. Field research was aided by a contract between the Office of Naval Research, Department of the Navy, and the National Academy of Sciences, NR 160-175. To those museums which have made their collections of Micronesian Coccinellidae available for study, I express my appreciation. I extend my thanks to Mutsuo Miyatake for his generous and prompt response to my needs for specimens and literature not available to me, to N. L. H. Krauss for much material from Micronesia and the adjacent regions, to J. L. Gressitt and Setsuko Nakata for patiently answering my numerous inquiries, and to Dolores Bush for her help in typing the manuscript in its final shape.

Distributional List of Micronesian Coccinellidae

	Micronesia Islands Groups													
					Caroline									
	Bonin	Volcano	N. Mariana	S. Mariana	Palau	Yap	Caroline Atolls	Truk	Ponape	Marcus	Wake	Marshall	Gilbert	Other Localities
1. Epilachna philippinensis				×				×						Philippine Is.
2. Psyllobora mexicana*					×									Mexico
3. Cryptolaemus montrouzieri	×		×	×	×									Widely distributed
4. Nephus roepkei	×	×	×	×	×		×				×	×	×	Java
5. N. melinus*						×								
6. Scymnus (Scymnus) nigrosuturalis	×	×		×							×	×		Ryukyu Is.
7. S. (Pullus) loewii										×	×			New World
8. S. (Pullus) uncinus*												×	×	
9. S. (Pullus) trukensis*								×						
10. S. (Pullus) ebeninus*					×									
11. Parascymnus palauensis*					×									
12. Pseudoscymnus anomalus*				×				×						
13. Cryptogonus orbiculus				G†										Indomalaya
14. Acarinus kraussi*				G										
15. Coelophora inaequalis	×		×	×	×		×	×			×	×	×	S.E. Asia
16. C. boulardi				×										
17. Menochilus sexmaculatus					×									Indo-Malayan region
18. Olla abdominalis				G										New World
19. Coccinella punctata		×												Palaearctic
20. C. repanda			×	×	×	×	×					×	×	Asia, Australia
21. Synharmonia scalaris	×													Japan, Taiwan
22. Harmonia axyridis	×													East Palaearctic
23. H. arcuata			×	×								×	×	Indo-Australian region
24. Pharellus setosus*							×	×						
25. P. yapensis*						×								
26. P. villosus*					×									
27. P. calvus*								×						
28. P. ponapensis*									×					
29. P. palauensis*					×									
30. P. guamensis*				G										
31. P. dybasi*				×										
32. Ortalia tricolor*				G										
33. Rodolia cardinalis				G										
34. R. breviuscula				?								?		India
35. R. pumila	×			×	×	×	×	×	×			×		China
36. Telsimia nitida	×		×	×	×	×	×	×	×			×		
37. T. yapensis*						×								
38. T. ephippiger*					×									
39. T. megalops*					×									
40. Sticholotis ruficeps				×										Malaya
41. Azya trinitatis				?										West Indies
42. A. orbigera				G										
43. Cryptognatha nodiceps				?										Trinidad, So. America
44. Catana spilota				×										Philippine Is.
45. C. dimidiata*					×									
46. Halyzia 16-guttata				?										Palaearctic
47. Pseudoscymnus kurohime				?										Ryukyu Is.
48. Verania discolor				?										Asia

* Described as new.
† Guam only.

SYSTEMATICS

Key to Micronesian Genera of Coccinellidae

1. Mandible multidentate; antenna 11-segmented 2
Mandible, at most, with one tooth in addition to the apex, placed on ventral face, apex and tooth subconical; antenna often with less than 11 segments; tibial spurs absent at least from first pair of legs; antennae inserted near lower margin of eyes 4

2(1). Mandibular teeth flattened or subconical, larger ones triangular and placed along inner edge; tibial spurs present on all legs; antennae inserted high on front between eyes; pronotum and elytra densely pubescent .... **Epilachna**
Mandibular teeth small to minute, triangular, somewhat flattened, placed along outer, ventral edge near apex; tibial spurs absent from front legs; antennae inserted below middle of eyes; pronotum and elytra glabrous 3

3(2). Coxal arcs obsolete; terminal segment of labial palp not as stout as preceding segment; species of larger size, above 4 mm .... **Halyzia**
Coxal arcs present; terminal segment of labial palp stouter than preceding segment; species of smaller size, under 4 mm .... **Psyllobora**

4(1). Abdomen with six visible sternites 5
Abdomen with five visible sternites 22

5(4). Eyes sparsely set with fine erect hairs 6
Eyes glabrous 12

6(5). Antenna 11-segmented 7
Antenna with less than 11 segments 10

7(6). Prosternum produced anteriorly, shielding mouthparts when head is in repose .... **Cryptolaemus**
Prosternum not at all produced anteriorly 8

8(7). Prosternal intercoxal lobe moderately broad, without carinae; coxal arc incomplete, directed toward lateral margin of sternite but failing to reach it .... **Nephus**
Prosternal intercoxal lobe narrow, carinate 9

9(8). Coxal arc complete, joining basal margin of sternite near lateral margin .... **Scymnus (Pullus)**
Coxal arc incomplete, directed toward basal margin near lateral margin but failing to reach basal margin .... **Scymnus (Scymnus)**

10(6). Antenna 8-segmented .... **Parascymnus**
Antenna 9-segmented 11

11(10). Underside without deep cavities to receive the legs; second sternite normal .... **Pseudoscymnus**
Underside with deep cavities for the reception of the legs in repose; second abdominal sternite very short at median line .... **Cryptogonus**

12(5). Antenna 11-segmented 13
Antenna with less than 11 segments 19

13(12). Tibial spurs present on second and third pairs of legs 14
Tibial spurs absent from all legs 18

14(13). Elytral epipleura wide, deeply concave and strongly descending externally 15
Elytral epipleura moderate to narrow, not deeply concave and almost horizontal 17

15(14). Prothorax with a shallow, more or less circular excavation beneath anterior angles; area enclosed by coxal arc not crossed by an oblique ridge .... **Coelophora**
Prothorax without excavation beneath anterior angles; area enclosed by coxal arc crossed by an oblique ridge 16

16(15). Antennal club fusiform, penultimate segment oblique at apex, basal segment broadly lobed .... **Menochilus**
Antennal club obtriangular, penultimate segment transverse at apex, basal segment not broadly lobed .... **Olla**

17(14). Anterior margin of mesosternum entire .... **Coccinella**
Anterior margin of mesosternum slightly emarginate .... **Synharmonia**

18(13). Elytral epipleura moderate, feebly concave, and nearly horizontal.... **Harmonia**
Elytral epipleura wide, concave and strongly descending externally.... **Verania**

19(12). Antenna 10-segmented 20
Antenna with less than 10 segments; mandible with subapical supplementary tooth; size small to medium 21

20(19). Size minute; sparsely pubescent; mandible simple, without supplementary tooth .... **Pharellus**
Size medium; covered with short pubescence; mandible with subapical supplementary tooth .... **Ortalia**

21(19). Antenna 8-segmented; terminal segment of maxillary palp broadly securiform; coxal arc complete or nearly so .... **Rodolia**
Antenna 7-segmented; terminal segment of maxillary palp flattened-cylindrical with oblique apex; coxal arc incomplete .... **Telsimia**

22(4). Antenna 11-segmented; prosternum normal 23
Antenna with less than 11 segments; prosternum produced anteriorly, shielding mouthparts when head is in repose 24

23(22). Dorsal surfaces glabrous; antennal club fusiform, compact.... .... **Sticholotis**
Dorsal surfaces densely pubescent; antennal club lax .... **Azya**

24(22). Antenna 10-segmented; aedeagus symmetrical .... **Cryptognatha**
Antenna 9-segmented; aedeagus strongly asymmetrical .... **Catana**

Genus **Epilachna** Chevrolat

Epilachna Chevrolat, *In* Dejean, 1837, Cat. Coleopt., ed. **2**: 436; **3**: 460 (type: *Coccinella borealis* Fabricius, type by subsequent designation of Hope,

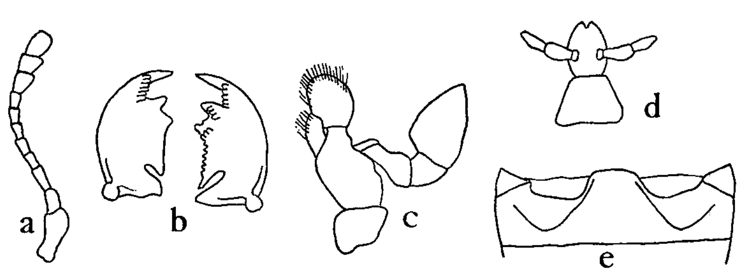


FIGURE 3.—*Epilachna borealis:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite.

1840; North America).—Dieke, 1947, Smithsonian Misc. Coll. **106** (15): 1-183, figs.

Body broadly oval, strongly convex, pubescent. Antenna 11-segmented, long, basal segment stout, three times longer than broad, second segment barrel-shaped, a little longer than broad, third through eighth segments equal in width but progressively shorter, ninth through eleventh segments forming a lax club. Mandible multidentate, terminal segment of maxillary palp securiform, of labial slender cylindro-acuminate. Labium widest at middle of length, mentum trapezoidal, widest at base. Prosternal carinae absent. Mesosternum weakly notched anteriorly. Metasternal lobe rounded. Abdomen with six visible sternites. Coxal arc on first abdominal sternite variable, usually complete. Tibial spurs present on all legs, contrary to rule. Tarsus 4-segmented. Claws variable, usually bifid with additional basal tooth. Male: aedeagus symmetrical; female: receptaculum seminis flask-shaped, without well-developed nodulus or ramus, sperm duct very short, infundibulum absent, hemisternites subcircular.

A large genus of worldwide distribution. The species feed mainly on Solanaceae and Cucurbitaceae; several species have become important agricultural pests. One species has been introduced recently into Micronesia.

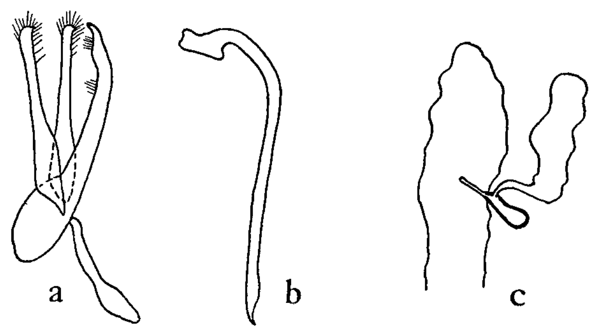


FIGURE 4.—*Epilachna philippinensis:* **a**, tegmen; **b**, sipho; **c**, receptaculum seminis.

1. **Epilachna philippinensis philippinensis** Dieke (fig. 4).

Epilachna philippinensis Dieke, 1947, Smithsonian Misc. Coll. **106** (15): 40, figs. 19, 118 (Philippine Is., Australia; type in U. S. Nat. Mus.).

Length: 5.6-7.2 mm. Punctation of head and pronotum even, dense, and fine; that of elytra a mixture of fine and coarse punctures, the fine punctures evenly, the coarse sparsely and irregularly distributed. Pubescence very fine, short, and depressed. Ground color above and below light yellowish brown, elytra each with 14 deep piceous spots (6 in subspecies *remota* Dieke). Pronotum usually immaculate. Genitalia as figured.

DISTRIBUTION: Philippine Is., Australia, Micronesia. Specimens seen: 65.

S. MARIANA IS. SAIPAN, TINIAN, ROTA, GUAM: Jan.-Nov. 1949-1952, Baker, Beardsley, Kondo, Krauss, Maehler.

TRUK. Dublon I., Feb. 1948, Maehler.

HOST: Various Solanaceae.

Genus **Halyzia** Mulsant

Halyzia Mulsant, 1846, Hist. Nat. Coléopt. France, Sécurip., 148 (type: *Coccinella 16-guttata* Linnaeus, monobasic).

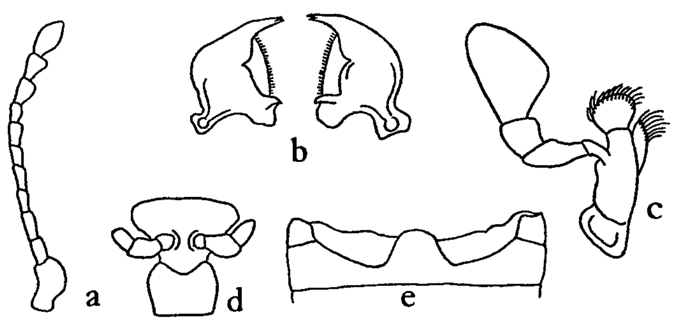


FIGURE 5.—*Halyzia 16-guttata:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite.

Body broadly oval, only slightly convex, glabrous. Antenna 11-segmented, basal segment stout, not quite twice as long as thick, second segment two-fifths as long as first, barrel-shaped, third and fourth segments slender, third half again as long as second or fourth, fifth through eighth segments approximately equal in length, fifth and seventh slightly wider apically than sixth or eighth, ninth and tenth segments triangular, similar, eleventh segment elliptical, not quite twice as long as tenth, the last three segments forming a very lax club. Terminal segment of maxillary palp very broadly securiform, that of labial palp stout but more slender than penultimate segment, ligula very broad anteriorly. Mandible with a row of about eight teeth along outer ventral edge near apex, first tooth of row similar in size and shape to apex of mandible, other teeth of row small, triangular. Prosternum not produced anteriorly, prosternal lobe without carinae. Abdomen with six visible sternites. Coxal arc missing on first visible sternite. Legs moderately long, tibiae slender, not modified, tibial spurs absent. Tarsus 4-segmented. Claw with a broad basal platelike tooth. Epipleura very broad, and continuous to apex of elytron, without well-defined cavities to receive tips of femora. Male: aedeagus symmetrical; female: receptaculum seminis with neither nodulus nor ramus prominent; cornu in shape of letter C; infundibulum absent, sperm duct short, hemisternites of the blade and handle type.

A small genus of mostly Old World species. See Appendix to this paper for discussion of a species whose occurrence in Micronesia is doubtful, though reported.

Genus **Psyllobora** Chevrolat

Psyllobora Chevrolat *In* Dejean, 1837, Cat. Coleop., ed. **3**: 458 (type: *Coccinella lineola* Fabricius, type by subsequent designation by Timberlake, 1943).

Phyllobora Chevrolat *In* d'Orbigny, 1844, Dict. Univ. Hist. Nat. **4**: 43.

Note: The fixation of *Coccinella 20-maculata* Say as type of *Psyllobora* by Crotch 1874 is invalid because *C. 20-maculata* was not among the originally included species.

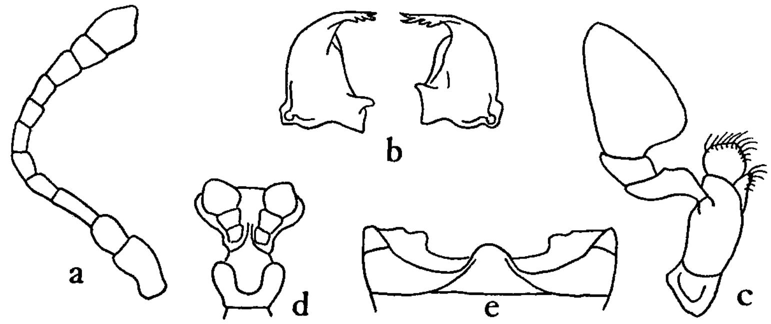


FIGURE 6.—*Psyllobora lineola:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite.

Body broadly oval, moderately convex, glabrous. Antenna 11-segmented, basal segment stout, about twice as long as thick, second segment half as long as basal, barrel-shaped, third through eighth segments slender, the third as long as the second, the others successively shorter, the seventh slightly broader apically than the eighth, ninth and tenth triangular, eleventh broadly oval, the three forming a compact, obtriangular club. Terminal segment of maxillary palp very broadly securiform, that of labial palp globose, stouter than penultimate segment, ligula broad anteriorly. Mandible with a row of from three to nine teeth along outer ventral edge near apex, first tooth of row similar to apex, other teeth small, triangular. Prosternum not produced anteriorly, prosternal lobe without carinae. Abdomen with six visible sternites. Coxal arcs on first abdominal sternite present, incomplete, joining posterior margin of sternite at lateral third. Legs moderately long, tibiae slender, simple, tibial spurs absent. Tarsus 4-segmented. Claw with a broad basal tooth. Epipleura broad, narrowing apically and ending before apex of elytron, without well-defined cavities. Male: aedeagus symmetrical; female: receptaculum seminis with nodulus usually and ramus always well defined, cornu often very long and slender, often twisted or contorted, infundibulum usually present, sperm duct short, hemisternites of the blade-and-handle type.

A New World genus of some 50 species, one of which has been introduced into Palau.

2. **Psyllobora mexicana** Chapin, n. sp. (fig. 7).

Psyllobora luctuosa Mulsant, Gorham, 1892, Biol. Centr. Am., Coccinellidae, **7**: 166, pl. 9, fig. 16.

Length: 2.3-2.9 mm. Color pale whitish yellow, ornamented with brownish spots. Punctation of head moderately coarse, dense, somewhat confused, that of pronotum and elytra extremely fine, integuments shining, glabrous. Pronotum with five spots, the smallest one in front of scutellum, the other four ranged in an arc about this spot; lateral margins reflexed, reflexed portion transparent, sides broadly rounded, basal and apical margins without bead. Elytra with lateral margins narrowly reflexed, sutural margins not beaded. Each elytron with 11 small spots, arranged as follows: one, in scutellar angle, elongate oval, oblique, not closely approaching either basal or

sutural margin; two, on inner side of humeral callus, roundish, about same size as spot one; three, outside and slightly behind humeral callus, about one-third as large as either spot one or two; four, elongate oval, lying parallel to and separated from the sutural margin by its shorter diameter, at the second fifth of the length of the elytron; five, a small round spot near lateral margin at level of posterior extremity of spot four; six and seven, the largest spots and usually joined at their outer sides to form a coarse C (on the left elytron), on disc at middle of length of elytron; eight, similar in shape and size to and directly behind spot four, its anterior extremity a little in advance of the posterior limit of spot seven; nine, at level of spot eight, near lateral margin, shaped as a comma with head toward lateral margin and tail directed toward apical angle of elytron; ten and eleven, two small, roundish spots in the apical area, similar in size and shape, the outer (eleven) nearer to lateral margin than the inner (ten) is to the suture. Underparts of prothorax whitish, anterior half to third of mesosternum dark, metasternum dark, mesepimera and metepimera white, posterior one-half or two-thirds of metepisterna also white. First and second visible abdominal sternites dark. Legs, antennae, and mouth parts pale throughout. Genitalia as figured.

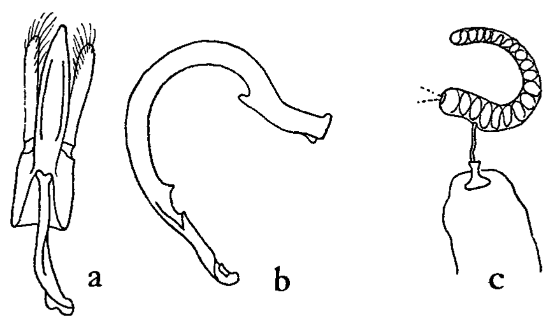


FIGURE 7.—*Psyllobora mexicana:* **a**, tegmen; **b**, sipho; **c**, receptaculum seminis.

Holotype, male (US 66328), Mexico, Morelos: Cuernavaca, June 1959, Krauss. Paratypes: Female, same data as holotype except May 1956; one, Cuernavaca, without further data; one, Mexico, Hidalgo: San Miguel, W. M. Mann; one, Koror, Mar. 1948, Maehler.

DISTRIBUTION: Mexico, Caroline Is. (Palau). Specimens seen: 4.

Psyllobora luctuosa Mulsant and *P. tardigrada* Mulsant, two Colombian species, have been reported from Mexico. The present species is separated from the first of these by the arrangement of the markings, and from the second by its much smaller size and by the arrangement of the markings. Crotch synonymized the two Mulsant species but I doubt the synonymy.

Genus **Cryptolaemus** Mulsant

Cryptolaemus Mulsant 1853, Soc. Linn. Lyon, Ann. **1**: 268; Opusc. Ent. **3**: 140 (type: *Cryptolaemus montrouzieri* Mulsant, monobasic).

Body oval, convex, finely pubescent. Antenna 10-segmented, basal segment stout, second barrel-shaped, longer than broad, third slender, elongate, widened at apex, fourth through seventh about equal, eighth through tenth forming a lax club. Terminal segment of maxillary palp elongate securiform, of labial palp cylindro-acuminate. Mandible with subapical tooth. Prosternum broadly rounded anteriorly and produced sufficiently to cover the mouthparts and antennae when head is in repose, carinae weak, parallel, reaching less than halfway to anterior margin of prosternum. Mesosternum weakly notched anteriorly. Metasternal lobe truncate. Abdomen with six visible sternites. Coxal arc on first abdominal sternite complete. Tibial spurs absent. Tarsus 3-segmented. Claw with a broad basal, subquadrate tooth equal to half length of claw. Male: aedeagus symmetrical; female: receptaculum seminis with ramus undeveloped, sperm duct short, infundibulum a tiny sclerite at head of bursa copulatrix, hemisternites elongate triangular.

Cryptolaemus is a small genus centered in the Indo-Australian region. One species has been widely distributed by entomologists as an important predator on scales. It is one of several genera of Coccinellidae in which the separation of the third and fourth (claw) segments is absent. Mostly, these genera do not appear to be closely related.

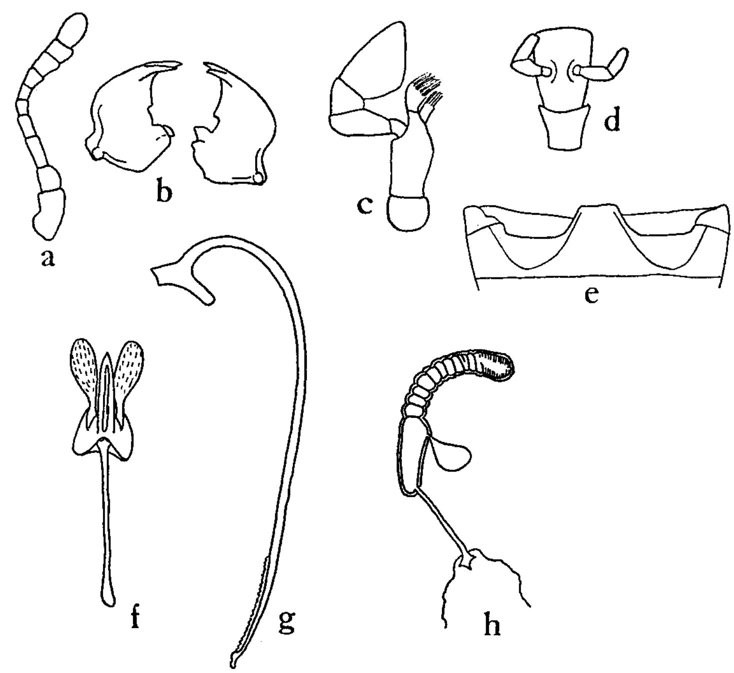


FIGURE 8.—*Cryptolaemus montrouzieri:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite; **f**, tegmen; **g**, sipho; **h**, receptaculum seminis.

3. Cryptolaemus montrouzieri Mulsant (fig. 8).

Cryptolaemus montrousieri Mulsant, 1853, Soc. Linn. Lyon, Ann. **1**:268; Opusc. Ent. **3**:140 (Australia; type probably at Lyon).

Cryptolaemus montrouzieri, Crotch, 1874, Revis. Coccinellidae, 204 (emendation of *montrousieri*).

Length: 3.4-4.5 mm. Body form oval; punctation of head and pronotum fine and dense, of elytra similar except on humeral callus which is shining and almost devoid of punctures. Head, prothorax, tips of elytra and abdomen reddish yellow, mesosterna and metasterna, legs and elytra (except tips) black or blackish. Genitalia as figured.

DISTRIBUTION: Southern Palaearctic region, Indo-Australia, introduced into North America and the West Indies. Specimens seen: 161.

BONIN IS. CHICHI JIMA, OTOTO JIMA, ANI JIMA: Apr.-July, 1939-1958, R. Bohart, Kondo, Mead, Mitchell, Snyder.

N. MARIANA IS. AGRIHAN, PAGAN: Apr.-July, 1940-1951, R. Bohart, Mead, Yasumatsu and Yoshimura.

S. MARIANA IS. SAIPAN, TINIAN, AGIGUAN, ROTA, GUAM: Mar.-Nov., 1936-1952, G. Bohart, Dybas, Gressitt, Kondo, Krauss, Maehler, Matusita, Oakley, Swezey.

PALAU. KOROR, PELELIU: Apr.-Dec., 1939-1957, Beardsley, Dybas, Esaki, Gressitt, Langford, Sabrosky.

HOST: *Pulvinaria* sp. and mealybugs.

Genus **Nephus** Mulsant

Scymnus (*Nephus*) Mulsant, 1846, Hist. Nat. Coléopt. France, Sécurip., 237; 1850, Spec. Trim. Sécurip., 958 (type: *quadrimaculatus* Hübner, type by

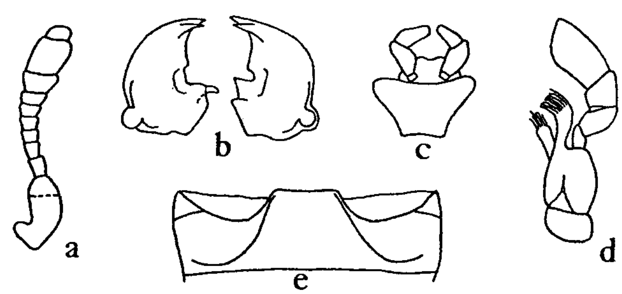


FIGURE 9.—*Nephus quadrimaculatus:* **a**, antenna; **b**, mandibles; **c**, ligula; **d**, maxilla; **e**, first abdominal sternite.

subsequent designation of Korschefsky, 1931).

Nephus Mulsant, Motschulsky, 1866, Soc. Imp. Nat. Moscou, Bull. **39**: 425.

Body oval, moderately convex, upper surface pubescent. Antenna pseudo-11-segmented, first and second segments completely ankylosed, basal segment moderately stout, curved, second segment separated from first by a false suture, not always visible, half as long as broad but equal in width to basal, third segment a little longer than

broad, fourth, fifth, and sixth segments of same width, the fifth slightly shorter than fourth or sixth, seventh, eighth and ninth segments progressively slightly longer and wider, tenth segment slightly longer than broad but nearly quadrate, eleventh segment half as long as tenth, almost hemispherical. Terminal segment of maxillary and labial palps much as in *Scymnus*. Mandibles as in *Scymnus*. Prosternum not produced anteriorly, prosternal intercoxal lobe wide and almost flat, without carinae. Abdomen with six visible sternites. Coxal arc incomplete, if continued would reach lateral instead of basal margin of sternite. Tibial spurs absent. Tarsus 4-segmented. Claw with acute basal tooth. Elytral epipleura as in *Scymnus*. Male: aedeagus symmetrical; female: receptaculum seminis with nodulus only slightly developed, ramus broadly conical, cornu wide at base and tapering to acute apex, infundibulum absent, sperm duct moderately long. Hemisternites elongate triangular.

A moderately large genus, like *Scymnus* of worldwide distribution.

4. **Nephus roepkei** (Fluiter) (fig. 10, *a-c*).

Scymnus roepkei Fluiter, 1938, Arch. Koffiecultuur Ned.-Ind. **12** (1): 49, figs. (Java; types in Leyden Museum).

Length: 1.3-1.8 mm. Body form oval; punctation of head fine but not dense, that of pronotum fine on disc, extremely fine toward lateral margins, rather dense, that of elytra similar to that on pronotal disc; pubescence short, yellowish, that on elytra mostly directed caudad, with only a small area at the apical angles directed laterad. Color deep piceous, elytra each with an oval spot of reddish yellow, abdomen and legs

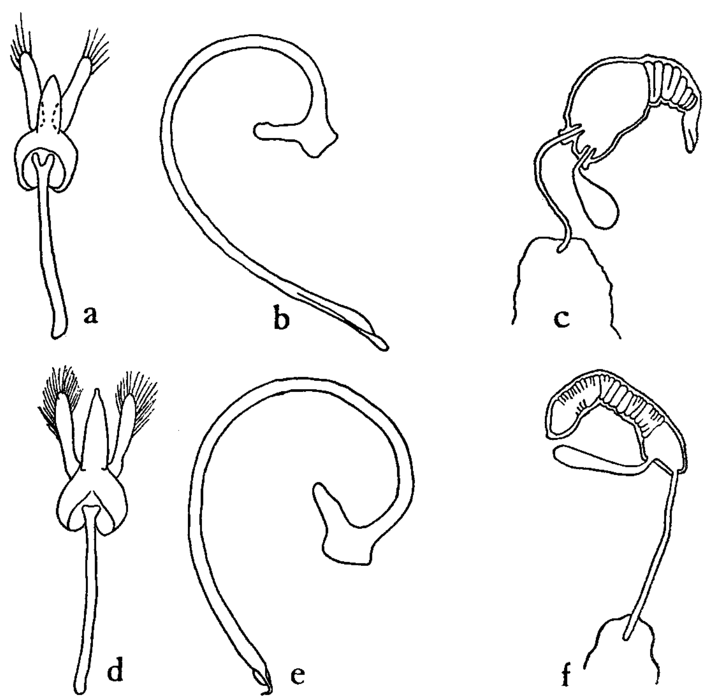


FIGURE 10.—**a-c**, *Nephus roepkei: a,* tegmen; *b,* sipho; *c,* receptaculum seminis. **d-f,** *N. melinus: d,* tegmen; *e,* sipho; *f,* receptaculum seminis.

somewhat paler. The elytral spot varies in size, is rarely absent, and lies with its long axis parallel to the long axis of body. Usually it is about one-half as long as elytron, and lies between basal three-tenths and apical two-tenths of elytral length. Genitalia as figured.

DISTRIBUTION: Java, Philippine Is., Micronesia. Specimens seen: 360.

BONIN IS. ANI JIMA, CHICHI JIMA, HAHA JIMA: Apr.-July, Dec. 1945-1958, Bertram, R. Bohart, Mead, Snyder.

VOLCANO IS. IWO JIMA: June 1958, Snyder.

N. MARIANA IS. AGRIHAN: July 1951, R. Bohart.

S. MARIANA IS. SAIPAN, TINIAN, ROTA, GUAM: Apr.-Sept., Nov. 1936-1958, G. Bohart, R. Bohart, Dybas, Fullaway, Gressitt, Krauss, Oakley, Stuntz, Swezey, Townes, Usinger, Yasumatsu and Yoshimura.

PALAU. KOROR, NGARMALK, PELELIU, ULEBSEHEL, LOSAP ATOLL, PIS I.: Jan.-Mar., Sept.-Oct., Dec. 1942-1953, Beardsley, Gressitt, Krauss.

WAKE. PEALE, WAKE: Nov. 1957-1959, Ford, Krauss.

MARSHALL IS. ENIWETOK, KWAJALEIN, JALUIT, MAJURO, TELAP: Mar.-May, Aug., Nov. 1946-1958, Beardsley, Clagg, Fosberg, Gressitt, Oakley, Townes, Tuthill.

GILBERT IS. TARAWA: Aug., Nov. 1956-1957, Brown, Krauss.

HOST: Not recorded.

These specimens have been compared with some of the original material of the species in the Korschefsky collection now at the U. S. National Museum.

5. Nephus melinus Chapin, n. sp. (fig. 10, *d-f*).

Length: 1.4-1.8 mm. Body form oval; punctation of head fine and rather sparse, especially at center of frons, that of pronotum fine, on anterior part of disc quite sparse, more dense laterally, that of elytra much coarser than that of pronotum, and moderately dense; pubescence short, yellowish, mostly directed caudad, with only a small apical area swirled. Color above and below light yellowish to reddish brown, except for lateral areas of pronotum which are yellowish white. There is no well-defined separation of the lighter and darker areas. Genitalia as figured.

Holotype, male (US 66329), Giliman, Yap I., Yap Is., June 12, 1957, Sabrosky. Five paratypes (BISHOP, KU, US), Yap I.: Oct. 1952, Krauss; Gilifiz-Rul, Sept. 8, 1939, Esaki; Kolonia, Apr. 23, 1954, and two, Apr. 25, 1954, Beardsley.

DISTRIBUTION: Caroline Is. (Yap). Specimens seen: 6.

HOST: Not recorded.

Genus **Scymnus** Kugelann

Scymnus Kugelann, 1794, Neues Mag. Liebh. Ent. **1** (5): 545.—Mulsant, 1850, Spec. Trim. Sécurip., 950.—Crotch, 1874, Rev. Coccinellidae, 239. (Type: *subvillosus* Goeze = *fasciatus* Fourc.; type by subsequent designation by Korschefsky, 1931.)

Scymnus (*Pullus*) Mulsant, 1846, Hist. Nat. Coléopt. France, Sécurip., 241; 1850, Spec. Trim Sécurip., 976.

Pullus Mulsant, Motschulsky, 1866, Soc. Nat. Moscou, Bull. **39**: 426.

Body oval, moderately convex, upper surface moderately densely pubescent. Antennae 11-segmented, basal segment stout, about twice as long as wide, slightly curved, second segment slightly shorter than broad but equal in width to basal; third segment slender, about twice as long as broad, fourth and sixth about equal, either shorter than fifth but all about the same width, seventh and eighth segments slightly longer and broader, ninth segment much wider at apex than at base, tenth segment a little broader than long, eleventh segment as long as tenth, rounded at apex, the last three segments forming a compact club. Terminal segment of maxillary palp subsecuriform, its apical margin strongly oblique; that of labial palp cylindro-acuminate. Mandible with lateral tooth subapical in position. Prosternum not produced anteriorly, prosternal lobe carinate. Abdomen with six visible sternites. Coxal arc incomplete (subgenus *Scymnus* s. str.) or complete (subgenus *Pullus* Mulsant). Tibial spurs absent. Tarsus 4-segmented, claw with an acute basal tooth. Elytral epipleura narrow, horizontal, not excavate for reception of tips of femora. Male: aedeagus symmetrical; female: receptaculum seminis

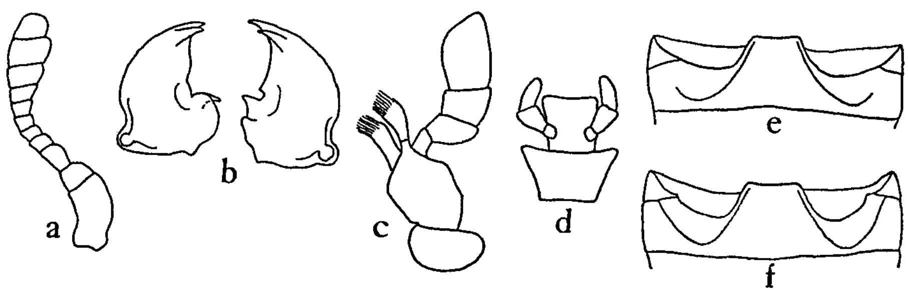


FIGURE 11.—a-e, *Scymnus* (s. str.) *nigrinus: a,* antenna; *b,* mandibles; *c,* maxilla; *d,* ligula; *e,* first abdominal sternite. f, *S.* (*Pullus*) *subvillosus:* first abdominal sternite.

without developed nodulus or ramus, cornu curved, sausage-shaped, blunt at apex; infundibulum present; sperm duct short, arising at the base of infundibulum and not passing through its length. Hemisternites broadly triangular, together forming an ovipositor.

In 1846, Mulsant commenced the dismemberment of the genus *Scymnus,* proposing new names for the sections, to wit: *Scymnus* s. str., *Nephus,* and *Pullus.* Since that time, various authors have retained these names as subgenera or have raised the sections to generic rank. After a careful study of the anatomy of many species of these different groups, including in all cases the type species, the present author considers that *Nephus* should be granted generic status. No important differences can be found between *Scymnus* s. str. and *Pullus* except in the formation of the metacoxal arcs. It will be noticed that the curvature of the arcs is, in general, the same in these two, the difference being in the extent of the arc. On the other hand, in *Nephus,* not only are the arcs differently formed but there are other important differences in the structure of the antennae, the prosternal lobe (without carinae), and the genitalia.

A large genus, worldwide in distribution. One species of *Scymnus* (s. str.) and four species of *Scymnus* (*Pullus*) are known in Micronesia.

KEY TO MICRONESIAN SPECIES OF SCYMNUS

1. Coxal arc incomplete; color pale brown with a dark sutural stripe which is widest at base and reaches nearly to apices of elytra; widely distributed...... ....6. **Scymnus (Scymnus) nigrosuturalis**
   Coxal arc complete; form more robust....................2
2. Elytra brown with markings of deep piceous....................3
   Elytra black, with or without narrow pale border at apices....................4
3. Elytral markings much as in *S.* (*S.*) *nigrosuturalis* but heavier and broader; Wake I., Marcus I....................7. **S. (Pullus) loewii**
   Elytral markings along suture strongly expanded at apical third and at base; Gilbert Is., Marshall Is....................8. **S. (P.) uncinus**
4. Elytra black with narrow pale border at apices, pronotum pale with median parabolic spot at base; Truk....................9. **S. (P.) trukensis**
   Elytra and pronotum entirely black, pubescence silvery; Palau.................... ....10. **S. (P.) ebeninus**

6. Scymnus (Scymnus) nigrosuturalis H. Kamiya (fig. 12).

Scymnus (*Scymnus*) *nigrosuturalis* H. Kamiya, 1961, Kyushu Univ., Jour. Fac. Agric. 11 (3): 293, 298, pl. 38, O, figs. 1, J, 2, Q, 4, B (type in Kyushu University).

Length: 1.6-2.1 mm. Body form oval; punctation of head fine, rather sparse, that of pronotum coarser, rather sparse on disc, more dense laterally, that of elytra similar to that on pronotal disc; pubescence short, yellowish, that on elytra swirled on apical half. Mesosternum, metasternum, and abdomen (except narrow margins) piceous, prosternum and legs paler. Upper parts (male) yellowish brown with dark piceous markings. Pronotum with a large squarish discal spot touching basal margin but not apical and covering discal third of width. Elytra with a sutural stripe which is widest at base where it is as wide or slightly wider than the pronotal spot, then narrows in the first fifth of the length to half that width and then narrows gradually to just before apices where it ends. In female head and most of pronotum are piceous and sutural stripe is broader. Genitalia as figured.

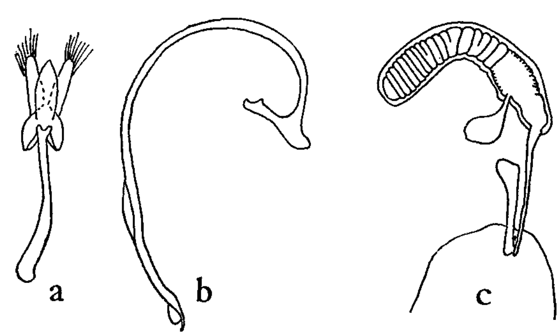


FIGURE 12.—*Scymnus* (s. str.) *nigrosuturalis*: **a**, tegmen; **b**, sipho; **c**, receptaculum seminis.

DISTRIBUTION: Ryukyu Is., Micronesia. Specimens seen: 34.

BONIN IS. CHICHI JIMA, HAHA JIMA, OTOTO JIMA: Apr.-June 1956-1958, Clagg, Mitchell, Snyder.

VOLCANO IS. IWO JIMA: June 1958, Snyder.

S. MARIANA IS. SAIPAN, GUAM: Feb., Aug., Oct. 1952-1958, Krauss.

WAKE. PEALE: Nov. 1957, Krauss. WAKE: Nov. 1959, Ford.

MARSHALL IS. KWAJALEIN: Feb. 1958, Krauss.

HOST: Not recorded.

7. **Scymnus (Pullus) loewii** Mulsant (fig. 13, *a-c*).

Scymnus (*Pullus*) *loewii* Mulsant, 1850, Spec. Trim. Sécurip., 980.—Gorham, 1897, Biol. Centr. Am. **7**: 227, pl. 12, fig. 20 (Mexico; type in Cambridge University Museum).

Scymnus cinctus Leconte, 1852, Acad. Nat. Sci. Philadelphia, Proc. **6**: 137 (New Orleans, Louisiana; type in Mus. Comp. Zool.).

Length: 1.8-2.2 mm. Body form oval; punctation of head fine and dense, that of pronotum rather coarser on disc, very fine and dense laterally, that of elytra similar to that on pronotal disc; pubescence short, yellowish, swirled on apical two-thirds. Color of under parts and legs deep piceous, sometimes with lateral margins of abdom-

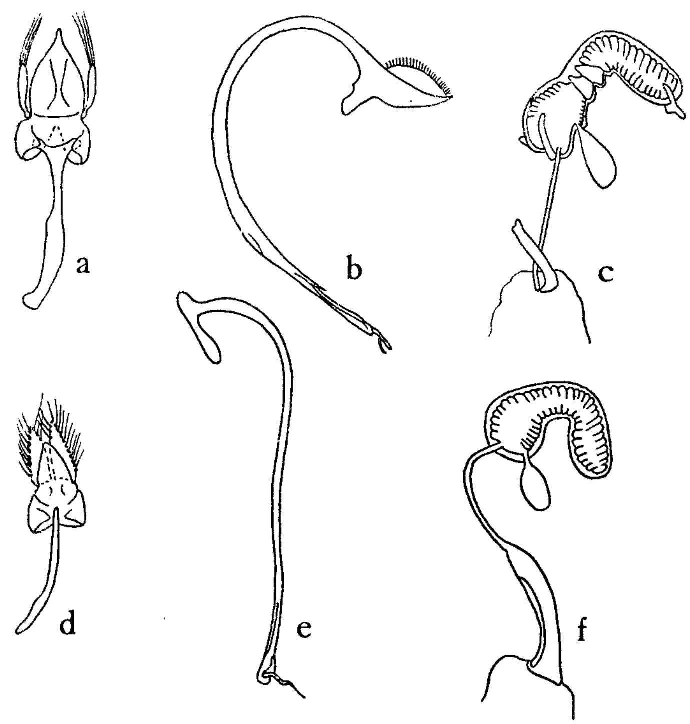


FIGURE 13.—**a-c**, *Scymnus* (*Pullus*) *loewii*: *a*, tegmen; *b*, sipho; *c*, receptaculum seminis. **d-f**, *S.* (*Pullus*) *uncinus*: *d*, tegmen; *e*, sipho; *f*, receptaculum seminis.

inal sternites pale. Front of head pale to deep chestnut. Pronotum chestnut to pale yellowish brown with a piceous spot at base which reaches forward two-thirds to anterior margin and covers median third of width. Elytra chestnut to pale yellowish brown with a piceous sutural stripe which at base is as wide as pronotal spot, becoming narrower gradually as it approaches apical angles which it fails to reach. In many specimens, the dark area is greater, reaching to humeral callus on either elytron, in which case pronotal spot is correspondingly broader. Genitalia as figured.

DISTRIBUTION: Southern United States south to Colombia, Johnston I., Micronesia. Specimens seen: 7.

WAKE. Nov. 1957, Krauss; 1959, Ford.

MARCUS. May 1952, Sakagami.

HOST: Not recorded.

8. Scymnus (Pullus) uncinus Chapin, n. sp. (fig. 13, *d-f*).

Length: 1.8-2.0 mm. Body form oval; punctation of head fine and moderately dense, that of pronotum slightly more coarse, rather sparse on disc, more dense laterally, that of elytra coarse and moderately dense except around the humeral callus and between the short, sutural rows of very coarse punctures. These rows, one on each elytron, are relatively poorly defined, most easily seen as boundary lines of enclosed smooth area of sparse and fine punctures. Pubescence swirled in apical half of elytra. Head and pronotum light to dark castaneous, pronotum with a not sharply defined quadrate piceous spot on disc which reaches nearly to anterior margin and includes eyes laterally. Scutellum piceous. Elytra castaneous to pale yellowish brown, with piceous black markings as follows: a more or less triangular spot with its base along basal margin of elytra and extending between humeral callosities and with its apex on the suture at about basal two-fifths. This triangle is connected by a short sutural stripe with broad, slightly curved, transverse band which is abruptly widened at suture and whose extremities fail narrowly to reach lateral margins. The whole design bears some resemblance to a conventional anchor. Under parts and legs uniform in color, varying from yellowish brown to dark castaneous. Genitalia as figured.

Holotype, male (BM), Betio I., Tarawa Atoll, Gilbert Is., Aug. 15, 1956, E. S. Brown. Paratypes: three, same data as holotype; one, Tarawa Atoll, Bairiki I., Nov. 1957, Krauss; one, Butaritari Atoll, Butaritari I., Dec. 1957, Krauss. Three paratypes (BISHOP), Marshall Is.: Mili Atoll, Mili I., Oct. 1953, Beardsley; Jaluit Atoll, Jabor I., May 1958, Gressitt; Jaluit Atoll, Kinajon I., Apr. 1958, Gressitt.

DISTRIBUTION: Gilbert Is., Marshall Is. Specimens seen: 9.

HOST: Not recorded.

9. Scymnus (Pullus) trukensis Chapin, n. sp., (fig. 14, *a-c*).

Length: 1.8-2.2 mm. Body form oval; punctation of head very fine and dense, punctures evenly distributed, that of pronotum similar, that of elytra more coarse and not as dense, without short, subsutural rows of very coarse punctures on disc; pubescence short, slightly swirled in apical half. Abdomen, prosternum and legs, head and appendages, pronotum except for a parabolic spot at base in front of scutellum, and extreme apices of elytra yellowish to reddish brown; mesosterna and metasterna, pronotal spot, and elytra (except apices) piceous black. Genitalia as figured.

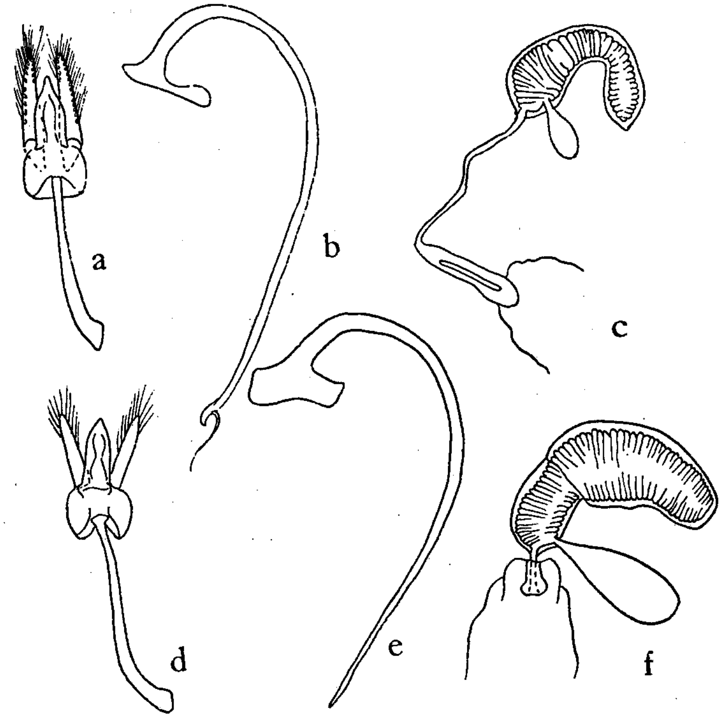


FIGURE 14.—**a-c,** *Scymnus (Pullus) trukensis: a,* tegmen; *b,* sipho; *c,* receptaculum seminis. **d-f,** *S. (Pullus) ebeninus: d,* tegmen; *e,* sipho; *f,* receptaculum seminis.

Holotype, male (US 66330), Fefan I., Truk Atoll, May 27, 1946, Oakley. Eight paratypes: three with same data as holotype; Truk Atoll, Moen I., two, Jan. 1953, Gressitt; one, Apr. 1949, Potts; two, Truk Atoll, Dublon I., Feb. 1948, Maehler, Oct. 1952, Beardsley.

DISTRIBUTION: Caroline Is. (Truk). Specimens seen: 11.

HOST: Not recorded.

Two specimens from Nomwin Atoll, Fananu I., Feb. 1954, Beardsley, are tentatively referred to this species. One of them shows distinct traces of the short, subsutural puncture rows, but is otherwise typical.

10. Scymnus (Pullus) ebeninus Chapin, n. sp. (fig. 14, *d-f*).

Length: 1.8-2.0 mm. Body form oval; punctation of head very fine and dense, that of pronotum similar, that of elytra slightly more coarse except on the area enclosed by the short, subsutural rows of still coarser punctures. These rows, two on each elytron, are distinctly defined and the inner rows enclose an area, highly polished and almost devoid of punctures. Pubescence silvery gray, swirled on apical two-thirds. Head of male, mouthparts, tibiae, and tarsi pale brown, the rest of the body, above and below, black. Genitalia as figured.

Holotype, male (US 66331), Ngerehelong, Babelthuap I., Palau Is., Dec. 18, 1947, Dybas. Three paratypes (CM, US, BISHOP): Babelthuap I., Ulimang, Dec. 1947, Dybas; one, Koror I., Nov. 1947, Dybas; two, Koror I., Mar.-Apr. 1954, Beardsley.

DISTRIBUTION: W. Caroline Is. (Palau). Specimens seen: 7.

HOST: Not recorded.

Genus **Parascymnus** Chapin, new genus

Body oval, strongly convex, surface set with fine, short pubescence. Antenna 8-segmented, basal segment stout, twice as long as broad, apparently the result of the fusion of two segments, second segment not quite twice as long as broad, wider apically than at base, third segment much broader than long, fourth segment similar to third in form but smaller in all dimensions, fifth segment similar to but slightly broader than third and forming with the remaining segments a compact, oval, 4-segmented club, seventh segment broadest of the four and slightly longer than either the sixth or eighth, eighth segment subhemispherical, slightly flattened apically. Basal and apical segments furnished with a few long setae. Terminal segment of maxillary palp with lateral margins nearly parallel, strongly, obliquely truncate apically; that of labial palp cylindrical, twice as long as broad, apex rounded. Mandible with subapical tooth. Prosternum not produced anteriorly, prosternal lobe flat, carinae only feebly indicated. Abdomen with six visible sternites. First visible sternite with incomplete coxal arcs, which run almost parallel to posterior margin of sternite and are directed toward lateral margin of same. Tibial spurs absent. Tarsus 3-segmented. Claw with small, subquadrate basal tooth. Elytral epipleura horizontal, not excavate, ending at level of posterior margin of first visible sternite. Male: not known, probably symmetrical. Female: receptaculum seminis with nodulus short, ramus not developed, cornu thick and slightly curved. Sperm duct not followed in preparation but apparently short, infundibulum not seen, apparently absent. Hemisternites elongate triangular.

Type species, *Parascymnus palauensis,* new species.

The type, and only species known to belong to this genus, occurs on Palau.

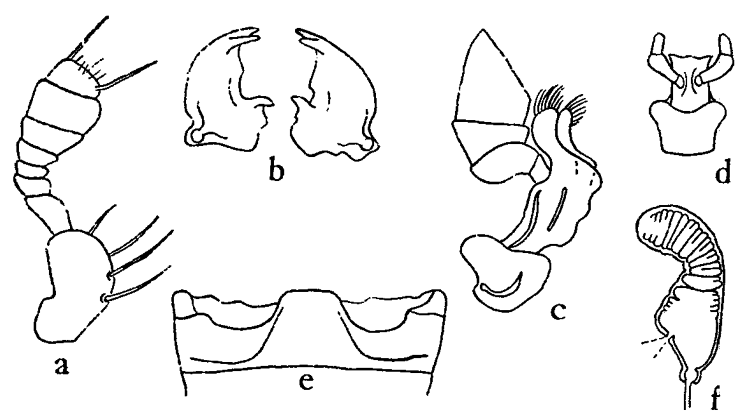


FIGURE 15.—*Parascymnus palauensis:* **a,** antenna; **b,** mandibles; **c,** maxilla; **d,** ligula; **e,** first abdominal sternite; **f,** receptaculum seminis.

11. **Parascymnus palauensis** Chapin, new species (fig. 15).

Length: 1.8-1.9 mm. Body form oval, robust; punctation of head and pronotum fine and dense, that of elytra coarser and more sparsely placed, somewhat finer toward apices. Head, pronotum, abdomen, and legs bright orange brown, mesosterna and metasterna, scutellum, an irregular area in basal third of elytra, and a small triangular spot, common to the two elytra, just before apices, black. Basal black area on elytra is deeply emarginate behind on each elytron so that posterior margin of area is tricuspid, the black reaching almost to midpoint of elytra at lateral margins and on suture. Subapical triangular spot lies with its apex on suture at about apical fourth; its base is a straight line perpendicular to suture at apical eighth and covers two-thirds of width of elytra. Male not studied. Female receptaculum seminis as figured.

Holotype, female (US 66332), Koror I., Palau Is., Nov. 21, 1947, Dybas; one paratype, sex undetermined, Palau Is., Ngurukdabel (Urukthapel) I., Feb. 21, 1936, Esaki.

DISTRIBUTION: Caroline Is. (Palau). Specimens seen: 2.

HOST: Not recorded.

Genus **Pseudoscymnus** Chapin

Pseudoscymnus Chapin, 1962, Psyche **69**: 50.

Body form and size of *Scymnus* Kugelann, upper surface set with fine, short pubescence. Antenna 9-segmented; basal segment stout, almost as wide at its widest part as long; second segment stout barrel-shaped, nearly equilateral, sharply separated from basal segment; third through ninth segments forming a fusiform club, third longer than wide, fourth through seventh wider than long, each wider than the preceding, eighth segment shorter than wide and slightly narrower than seventh, ninth segment a little more than half as wide as eighth, subconical. The ninth segment bears at its apex several long setae. Maxillary palp with the three segments nearly equal in width, the terminal segment parallel-sided with apex sharply oblique. Terminal segment of labial palp stout barrel-shaped with truncate apex. Mandible with subapical tooth. Prosternum not produced anteriorly to cover mouthparts, prosternal lobe rather narrow, carinate. Abdomen with six visible sternites. Coxal arc incomplete, somewhat as in the genus *Nephus*. Tibiae simple, rather slender. Tibial spurs absent. Tarsus 3-segmented. Claw with subquadrate basal tooth. Elytral epipleura nearly flat and horizontal,

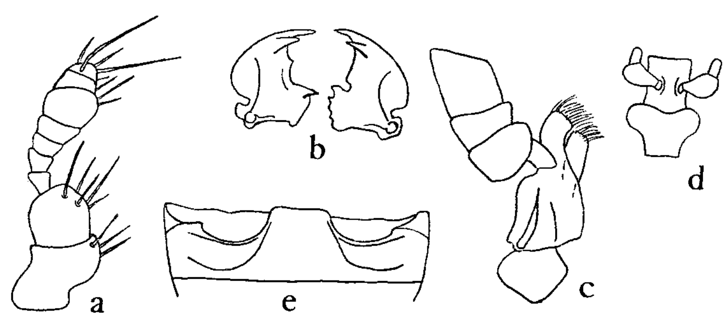


FIGURE 16.—*Pseudoscymnus hareja:* **a**, antenna: **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite.

not distinctly foveolate. Male: aedeagus symmetrical; female: receptaculum seminis with ramus short and stout, nodulus long, drawn out in a slender, curved tube, or short and stout, cornu curved, sausage-shaped. Sperm duct very short if nodulus is elongate tubular, otherwise moderately long. Infundibulum absent. Hemisternites intermediate between the "blade-and-handle" type of the majority of Coccinellidae and the "ovipositor" type of most of the Scymnini.

Type species, *Scymnus hareja* Weise, by original designation.

In spite of the extraordinary, but superficial, resemblance of these species to *Scymnus,* their differences seem to the writer to be of greater importance than their similarities. An analysis of the characters usually considered of importance in coccinellid taxonomy shows the genus to stand between *Scymnus* and *Cryptogonus.* In all three genera the eyes are hairy. *Cryptogonus* and *Pseudoscymnus* alike have 9-segmented antennae of a similar but unusual type and 3-segmented tarsi, whereas *Scymnus* and its near relatives have 11-segmented antennae of the more usual type and 4-segmented tarsi. Further, whereas in *Scymnus* and its near relatives the hemisternites are elongate triangular and together may act as an ovipositor, in *Cryptogonus* they are transverse apically and set with a sparse fringe of setae. In *Pseudoscymnus* they are intermediate in form as between these genera.

Pseudoscymnus is a genus of few species, known to inhabit the Japanese islands and some of the smaller islands to the south. One species is known with certainty from Micronesia; a second species may possibly occur on Guam.

Key to Micronesian Species of Pseudoscymnus

Upper surface uniformly black; receptaculum seminis with short nodulus and long sperm duct..**P. kurohime**

Upper surface bicolored; head, pronotum, and apices of elytra reddish brown, rest of elytra black; receptaculum seminis with nodulus long-tubular....**12. P. anomalus**

Pseudoscymnus kurohime (Miyatake).

For its possible occurrence in Micronesia, see Appendix.

12. Pseudoscymnus anomalus Chapin, new species (fig. 17).

Length: 1.8-2.3 mm. Form and coloration essentially as of *Scymnus sylvaticus* Lewis but averaging smaller in size. Front of head broad between eyes, its width nearly as great as long diameter of eye, not densely but very finely punctate, pubescence rather long and woolly. Clypeus extended laterally in rounded lobes that partly enclose antennal sockets. Pronotum extremely finely and not densely punctate, punctures slightly more dense laterally. Elytra slightly more coarsely and densely punctate, pubescence only slightly swirled near apices. Head and pronotum light reddish brown, scutellum slightly darker, elytra piceous black except for apical ninth which is yellowish brown. The separation between black and brown areas is almost straight but tends to follow curvature of elytra. Prosternum entirely pale reddish brown to yellowish brown, prosternal lobe short, carinae fine and straight, nearly reaching anterior margin. Mesosternites and metasternites deep piceous black. Abdominal sternites pale yellowish brown except for median third of first sternite which is piceous. Legs yellowish brown. Coxal arc much as in *Scymnus sylvaticus* as illustrated by Bielawski (1957, Shikoku Ent. Soc., Trans. **5**: 71, fig. 6). Genitalia as figured.

Holotype, male (US 66333), Wena (Moen), Truk, Caroline Is., June 1961, Owen. Paratypes: 10, both sexes, same data; four, Saipan, Mariana Is., July 1960, Cantelo; Saipan, 16, Navy Hill, Sept. 3, 1963, on *Cocos nucifera,* Tenorio; Guam, 10, T. T. Compound, Dec. 11, 1963, on *C. nucifera,* Owen and Tenorio; one, Merizo, Dec. 1958, Krauss. Koror, Palau Is., eight, Tenorio; 26, Malakal I., Jan. 27, 1964, on *Aspidiotus destructor* on soursop, Tenorio. Yap, four, Map I., Dec. 5, 1963, on banana, Tenorio. Moen, Truk Is., one, on *Musa sapientum,* Aug. 29, 1963, Tenorio.

DISTRIBUTION: Mariana Is. (Saipan, Guam); Caroline Is. (Palau, Yap, Truk). Specimens seen: 65.

HOST: Found feeding on *Aspidiotus destructor* Signoret.

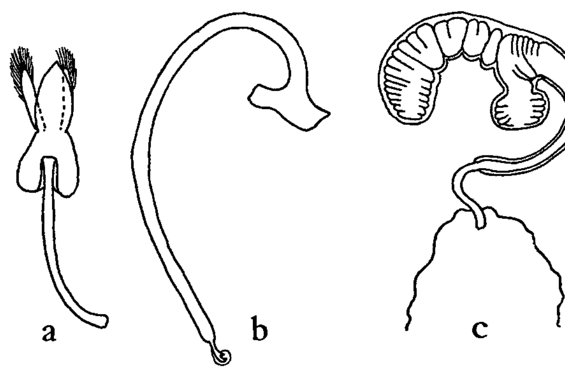


FIGURE 17.—*Pseudoscymnus anomalus:* **a,** tegmen; **b,** sipho; **c,** receptaculum seminis.

Were it not for Bielawski's restudy of one of the original specimens in the Lewis collection, one would hesitate to describe this species as other than *Scymnus sylvaticus* Lewis. Bielawski is definite as to the punctation of the head and pronotum and he has figured the male genitalia. From this we know that in *sylvaticus* the head and pronotum are densely and coarsely punctate, in contrast to the almost invisible punctation of the present species. The male genitalia are sufficiently different for easy differentiation; in *sylvaticus* the median lobe is elongate triangular and noticeably longer than the parameres and the sipho is unusually long with the apical portion long, slender, and attenuate, whereas in the present species the median lobe is suboval with the apex broadly triangular, this sclerite only slightly longer than the parameres and the sipho is relatively short, cylindrical, and abruptly terminating in a complicated apex.

Genus **Cryptogonus** Mulsant

Cryptogonus Mulsant, 1850, Spec. Trim. Sécurip., 945.—Crotch, 1874, Revis. Coccinellidae, 203.—Kapur, 1948, Roy. Ent. Soc. London, Trans. **99** (2):

90. [Type: *C. orbiculus* (Gyllenhal), monobasic.]

Body oval, moderately convex, very compact, surfaces densely set with fine, short pubescence. Antenna 9-segmented, basal segment stout, strongly lobed laterally, about twice as broad as long, second segment transverse, subtriangular, nearly 1.5 times as broad as long, but equal in length to basal segment, remaining segments forming a fusiform club, of these segments, seventh is longest, ninth short, caplike, partially embedded in eighth. Terminal segment of maxillary palp subglobular, somewhat broader than long, penultimate segment very stout; that of labial palp very slender, cylindrical, about twice as long as broad, penultimate segment more than three times as broad. Mandible with subapical tooth. Prosternum not produced anteriorly, deeply and broadly excavate laterally to receive anterior femora, prosternal lobe somewhat elevated, carinate, the carinae joined apically. Abdomen with six visible sternites. First visible sternite about three times as long at median line as at lateral margin, second sternite about three times as long laterally as at median line. Coxal arc incomplete, joining posterior margin of sternite near lateral fourth of width. Tibial spurs absent. Tarsus 3-segmented. Claw with subquadrate basal tooth. Elytral epipleura developed only between excavations for middle and posterior femora. Male: aedeagus symmetrical; female: receptaculum seminis with nodulus poorly developed, ramus undeveloped, sperm duct short, infundibulum absent, hemisternites a modification of the blade-and-handle type.

A small genus of the Indo-Malayan region, one species of which occurs on Guam.

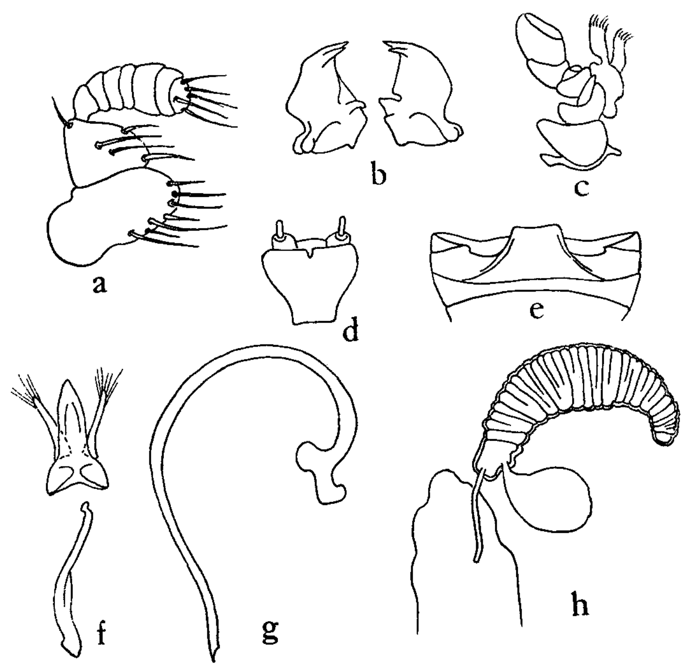


FIGURE 18.—*Cryptogonus orbiculus:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite; **f**, tegmen; **g**, sipho; **h**, receptaculum seminis.

13. **Cryptogonus orbiculus** (Gyllenhal) (fig. 18).

Coccinella orbicula Gyllenhal, 1808, *In* Schönherr, Syn. Ins. 2 (2): 205

(East Indies; type in Schönherr collection, teste Mulsant).

Cryptogonus orbiculus (Gyllenhal) Mulsant, 1850, Spec. Trim. Sécurip., 928.—Crotch, 1874, Revis. Coccinellidae, 203.—Kapur, 1948, Roy. Ent. Soc. London, Trans. **99** (2) : 90.—Miyatake, 1957, Shikoku Ent. Soc., Trans. **5** (7) : 113.

For extended synonymy, see papers by Kapur and Miyatake.

Length: 1.6-2.5 mm. Underparts deep castaneous to black, except tibiae and tarsi which are pale brown. Head of male bright yellow between eyes, that of female entirely black. Pronotum black, anterior angles in male usually yellow, in female rarely yellow. Elytra black, each with a single, usually rather large, oval to circular yellowish to reddish spot at about middle of length. Punctation nearly uniform throughout, rather fine and dense; pubescence short, depressed, and gray. Eyes very sparsely set with fine setae. Sixth sternite of male with a small median notch in apical margin, that of female entire. Genitalia as figured.

DISTRIBUTION: Generally throughout the Indo-Malayan region, north to Japan and China. Specimens seen: 2.

S. MARIANA IS. GUAM, two: Yigo, Dec. 1958, Krauss; Mt. Lamlam, Dec. 1958, Krauss.

Genus **Acarinus** Kapur

Acarinus Kapur, 1948, Roy. Ent. Soc. London, Trans. **90** (2) : 125 (type: *Acarinus philippinensis* Kapur by original designation).

Body small, rounded-oval, subhemispherical, usually larger in the female than in the male, upper surface densely set with fine, subdepressed pubescence. Antenna 9-segmented, basal segment broadly oval, second subtriangular, moderately acuminate on inner side, remaining seven forming a fusiform club with apical segment moderately long and acutely conical. Terminal segment of maxillary palp securiform, of labial palp small, cylindro-acuminate. Mandible with subapical tooth. Prosternal lobe flat, without carinae, sometimes with a very feeble, longitudinal, median groove. Elytral margins not reflexed, elytral epipleura as in *Cryptogonus.* Abdomen with six visible sternites, much as in *Cryptogonus*; the first sternite about five times longer than the second on median line, metacoxal arcs incomplete, curving backward and outward into the posterior margin of the sternite. Legs short, femora very broad, at rest fitting into deep cavities in the thorax and elytral epipleura. Male: aedeagus symmetrical; female: receptaculum seminis weakly chitinized, spherical in shape.

This genus, heretofore known only from the type species of the Philippine Islands, is here included on the basis of an undescribed species from Guam I.

14. **Acarinus kraussi** Chapin, n. sp.

Length: 1.9-2.2 mm. Underparts piceous brown, middle and hind legs dark, anterior tibiae and parts of femora pale yellowish brown, tarsi all pale. Head of male bright yellow between eyes, that of female entirely black. Pronotum black, lateral margins with subtriangular yellow spot reaching from apical to basal angles; very finely and densely punctured. Scutellum black. Elytra entirely black in male, black with poorly defined reddish-yellow markings in apical half in female; punctation slightly more coarse than that of pronotum. Fully marked specimens have an elongate post-

median discal area and a second area, linear in shape, behind and more laterally placed. The anterior of these areas may be absent; in the specimens before me the posterior linear mark is always visible, at least faintly. Pubescence fine and subdepressed, that of pronotum directed anteriorly, that of elytra directed variously, somewhat as in *Scymnus*. Eyes sparsely hairy. Sixth sternite of male not noticeably modified, broadly rounded as in female. Male genitalia: median lobe nearly three times longer than wide at base, slightly shorter than parameres, lateral margins nearly parallel through three-fourths of length, apex narrowly rounded; trabes about twice as long as median lobe; sipho very much as figured in *A. philippinensis* by Kapur. Female genitalia: not studied.

Holotype, male (BISHOP 6114), Guam, Yigo, S. Mariana Is., Dec. 1958, Krauss. Paratypes: two females, same data as holotype; female, Guam, Mt. Lamlam, Dec. 1958, Krauss.

DISTRIBUTION: S. Mariana Is. (Guam).

This species is easily separated from *A. philippinensis* Kapur by the elytral marking, the latter species having a single, rather large, subcircular, yellow spot at or just behind the middle of each elytron.

Genus **Coelophora** Mulsant

Coelophora Mulsant, 1850, Spec. Trim. Sécurip., 374, 390.—Crotch, 1874, Revis. Coccinellidae, 148.—Timberlake, 1943, Hawaiian Planters' Rec. **47**: 31. (Type: *Coccinella inaequalis* Fabricius, type by subsequent designation of Crotch.)

Body subcircular, glabrous, strongly convex. Antenna 11-segmented, rather similar to that of *Coccinella* except for the less compact club. Terminal segment of maxillary palp rounded securiform, of labial palp small, cylindro-acuminate. Mandible with sub-apical tooth. Prosternum not produced anteriorly, prosternal carinae slightly arcuate, reaching halfway to anterior margin, mesosternum with a deep triangular notch anteriorly, metasternal lobe very feebly notched. Abdomen with six visible sternites. Coxal arc on first abdominal sternite almost reaches posterior margin of sternite and follows it to lateral margin, the enclosed area without oblique ridge. Tibial spurs present but small. Tarsus 4-segmented. Claws with broad basal tooth. Epipleura broad, concave, strongly descending externally. Male: aedeagus symmetrical; female: receptaculum seminis with nodulus not developed, ramus and cornu well developed, sperm duct short, infundibulum absent (or present), hemisternites of the blade-and-handle type.

At present *Coelophora* contains many species, mostly from Asia and Indo-Malaya, but the genus is undoubtedly composite. Timberlake (1943) made a start at its dismemberment. Two species, one of which is assigned to *Coeloph-ora* tentatively, have been taken in Micronesia. These may be separated by the following characteristics:

Elytra heavily maculate, the basic pattern of nine spots on the two elytra, the apical spot common to both; pronotum with or without a dark bar along basal margin, infundibulum absent..**15. inaequalis**

Upper surface pale yellowish brown, except periphery of elytra and a spot on humeral callus (sometimes extended to apical fourth as a sublateral stripe) dark, infundibulum present..**16. boulardi**

15. **Coelophora inaequalis** (Fabricius) (fig. 19).

Coccinella inaequalis Fabricius, 1775, Syst. Ent., 80.

Coelophora inaequalis (F.) Mulsant, 1850, Spec. Trim. Sécurip., 404.—Crotch, 1874, Revis. Coccinellidae, 153.—Timberlake, 1943, Hawaiian Planters' Rec. **47**: 31.

Coccinella novempunctata Fabricius, 1775, Syst. Ent., 81 (not *C. novempunctata* L. 1758) (New Holland).

Coccinella novemmaculata Fabricius, 1781, Spec. Ins. **1**: 97 (New Holland).

Coelophora symbolica Mulsant, 1856, Soc. Linn. Lyon, Ann. **3**: 146; 1856, Opusc. Ent. **7**: 146 (China).

Length: 3.5-5.3 mm. Integuments finely and densely punctured. Prothorax with posterior angles very broadly rounded, anterior angles obtuse. Antenna little more than 1.5 times as long as interocular distance. Elytra with a few scattered large punctures close to narrowly reflexed lateral margins. Genitalia as figured. Coloration as follows:

Variety *novemmaculata* (Fabricius). Underparts, legs, mouthparts, and antennae pale yellow brown. Above yellow brown with black markings. Pronotum with two or

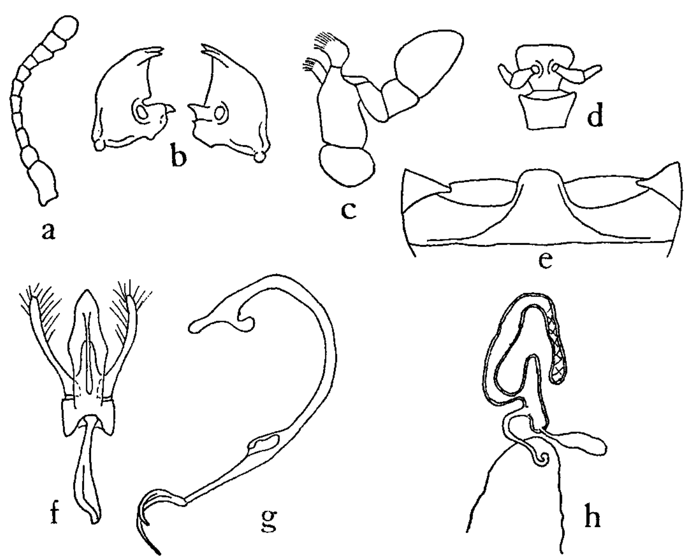


FIGURE 19.—*Coelophora inaequalis:* **a,** antenna; **b,** mandibles; **c,** maxilla; **d,** ligula; **e,** first abdominal sternite; **f,** tegmen; **g,** sipho; **h,** receptaculum seminis.

four roundish to triangular spots along basal margin, outer pair in basal angles, inner pair centrally located and separated by a little more than their diameters. Scutellum black. Elytra together with nine spots; one on each humeral callus; four in a transverse row just before the middle, the outer pair separated from lateral margins by at least half their diameters, the inner pair from the sutural margin by the same distance; two at apical fourth near lateral margins; one, common to the two elytra on suture just before apex. Genitalia as figured.

Variety *inaequalis* (Fabricius). Underparts and femora mostly black, tibiae, tarsi, mouthparts, and antennae pale yellow-brown. Pronotum with basal half largely black. The line of demarcation between the dark and pale areas is sinuate and the dark area is quadrilobate, the median pair of lobes separated more narrowly than either is separated from its lateral lobe. Scutellum black. Elytra with nine spots and the entire suture dark. The humeral spot is prolonged posteriorly and is obtriangular, the antemedian row is as in var. *novemmaculata*, the spot at apical fourth is larger and reaches the lateral margin. The sutural spot is evident but is part of the dark sutural stripe.

Variety *symbolica* Mulsant. Underparts, legs, etc., as in var. *novemmaculata* (Fabricius) except that metasternum is often darkened in middle. Pronotum as in var. *inaequalis* (Fabricius) except that the pigment area is slightly larger so that the four lobes are less definite. Scutellum black. Elytra more heavily pigmented than in the above described forms. The humeral spot is sometimes discrete, sometimes joined to the outer spot of the antemedian transverse row, which in turn is joined with the spot at apical fourth. The inner spots of the antemedian row are joined with the sutural stripe. Usually the spot at apical fourth is joined to the common anteapical spot in the sutural stripe.

DISTRIBUTION: Philippines to Celebes, Sumatra, Java, New Guinea, Australia, Tasmania, New Caledonia, Hawaiian Is., Midway I., Micronesia.

Variety **inaequalis** (Fabricius).

BONIN IS. CHICHI JIMA: July 1949, Kondo.

N. MARIANA IS. AGRIHAN, ANATAHAN, PAGAN: Apr.-Aug., 1940-1954, R. Bohart, Corwin, Langford, Mead, Yasumatsu and Yoshimura.

S. MARIANA IS. SAIPAN, TINIAN, ROTA, GUAM: Jan.-Dec., 1936-1958, G. Bohart, R. Bohart, Bryan, Ducoff, Dybas, Edgar, Esaki, Gressitt, Krauss, Lange, Langford, McDaniel, Matusita, Oakley, Swezey, Wallace.

TRUK. WENA (Moen), TONOAS (Dublon): Jan.-May, 1945-1949, Fosberg, Kono, Maehler, Oakley, Potts.

WAKE. WAKE, PEALE: Nov. 1957, Krauss, Nov. 1959, Ford.

MARSHALL IS. ENIWETOK, UJAE, LAE, LIB, AILUK, JEMO, KWAJALEIN, NAMU, AILINGLAPALAP, MAJURO, JALUIT, NAMORIK, KILI, EBON, ARNO, MILI: Jan., Mar.-Oct., Dec. 1936-1958, Gressitt, Krauss, Tuthill.

GILBERT IS. TARAWA: Aug., Nov.-Dec. 1956-1957, Brown, Krauss.

Specimens seen: 359.

Variety **novemmaculata** (Fabricius).

MARSHALL IS. ENIWETOK, UJELANG: Aug., Oct. 1953-1956, Beardsley, Tuthill.

Specimens seen: 15.

Variety **symbolica** Mulsant.

PALAU. ANGAUR, BABELTHUAP, KOROR, PELELIU: Mar.-May, July-Sept., Dec. 1939-1957, Beardsley, Ducoff, Esaki, Gressitt, Hagen, Krauss, Sabrosky, Townes.

CAROLINE ATOLLS. ULITHI: Falalop I., Sept. 1956, McDaniel.

Specimens seen: 29.

HOSTS: Various Aphididae, etc.

16. Coelophora boulardi (Mulsant) (fig. 20).

Daulis boulardi Mulsant, 1850, Spec. Trim. Sécurip., 315 (Guam, type in Paris Museum).

Callineda boulardi (Mulsant) Crotch, 1874, Revis. Coccinellidae, 162.

Anisolemnia mulsanti (Montrouzier) Swezey, 1942, B. P. Bishop Mus., Bull. **172**: 159 (not *Daulis mulsanti* Montrouzier, 1861).

Length: 5.0-6.5 mm. Head finely and irregularly punctate, antennae more than twice as long as interocular distance. Pronotum finely, densely, and evenly punctate, posterior angles narrowly rounded, anterior angles slightly less than 90 degrees. Elytra more sparsely and rather unevenly punctate. A short distance in from the margins, each elytron bears an irregular band of slightly larger punctures which are usually heavily pigmented. Underparts reddish brown, except mesepimera and metepimera which are whitish. Genitalia as figured.

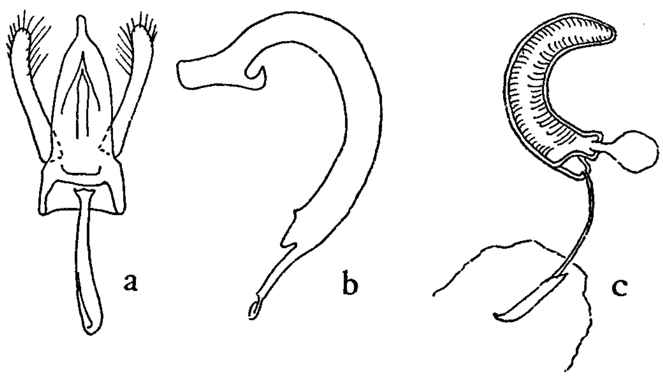


FIGURE 20.—*Coelophora boulardi:* **a**, tegmen; **b**, sipho; **c**, receptaculum seminis.

DISTRIBUTION: S. Mariana Is. Specimens seen: 8.

S. MARIANA IS. GUAM: 1911, Fullaway; Merizo, June 1936, Usinger. ROTA: Teteto-Tatacho-Sonson, Nov. 1937, Esaki; Sabara, Aug. 1940, Matusita.

HOST: Not recorded.

This species has been known from Guam since 1850 and may be considered endemic. A careful comparison of the specimens before me with the Montrouzier description [1861, Soc. Ent. France, Ann. IV, 1: 304] of *Daulis mulsanti* and the supplemental notes by Fauvel (1903, Rev. d'Ent. **22**: 327) lead me to doubt the correctness of the identification published by Swezey. In any event, Mulsant's description has priority. Furthermore, the species does not agree well with *Callineda 16-notata* (Fabricius), the genotype of *Callineda*. Crotch's assignment of the species to *Callineda* was tentative as he states "I have not seen this." In most of its characters it is much closer to *Coelophora*. The form of the sipho, of the receptaculum seminis, and the presence of an infundibulum suggest that eventually this species will be placed in a genus of its own. Such a move should wait until the present genus *Coelophora* is completely restudied.

Genus **Menochilus** Timberlake

Menochilus Timberlake, 1943, Hawaiian Planters' Rec. **47** (1) : 40 (type: *Coccinella sexmaculata* Fabricius, type by original designation; Indomalayan).

Cheilomenes Chevrolat, *In* Dejean, 1837, Cat. Coleopt., Ed. 2 : 435; 1837, Ed. **3** : 459 (type: *Coccinella lunata* Fabricius, type by subsequent designation by Crotch 1874, therefore isogenotypic with *Cydonia* Mulsant).

Chilomenes auctorum.

Body broadly oval, almost circular, moderately convex, glabrous. Antenna 11-segmented, moderately long, basal segment stout and broadly lobed in apical half, second segment about as long as broad, slightly narrowed at apex, third, fourth, and fifth nearly equal, subcylindrical, sixth, seventh, and eighth progressively shorter, each slightly broader apically, and together forming the basal portion of the fusiform club, ninth segment broader than long, tenth with apex strongly oblique, eleventh longer than broad and rounded at apex. Terminal segment of maxillary palp securiform, of labial palp cylindro-acuminate. Prosternal carinae parallel, reaching halfway to anterior margin of prosternum. Mesosternum feebly notched anteriorly. Metasternal lobe wider than long, broadly rounded. Abdomen with six visible sternites. Coxal arc on first abdominal sternite fails to reach posterior margin of segment and runs parallel to apical margin almost to lateral margin, enclosed area with oblique line. Tibial spurs present on middle and hind legs. Tarsus 4-segmented. Claws with triangular basal tooth. Male: aedeagus symmetrical; female: receptaculum with neither nodulus nor ramus developed, cornu stout, infundibulum absent, sperm duct very long and intricately contorted, hemisternites of the blade-and-handle type.

A genus of few species, distributed from India and China to New Guinea, and the islands of the Pacific. One species, possibly a recent introduction, has been taken on Angaur, Caroline Is.

17. Menochilus sexmaculatus (Fabricius) (fig. 21).

Coccinella sexmaculata Fabricius, 1781, Spec. Ins., 96.

Cheilomenes sexmaculata (Fabricius), Mulsant, 1850, Spec. Trim. Sécurip., 444.

Chilomenes sexmaculata (Fabricius), Crotch, 1874, Revision, 180.

Chilomenes sexmaculata var. *unifasciata* Weise, 1891, Deutsche Ent. Zeitschr. **1891** : 285.

Length: 3.5-6.4 mm. A species extremely variable in both size and coloration, ranging from nearly all black to pale yellowish brown with or without dark markings on elytra. Pronotal markings are fairly constant, and consist of a broad, even, dark band along posterior margin which nearly reaches posterior angles and an obtriangular dark spot on disc which is connected to basal band at its middle point by a narrow isthmus.

The most common elytral type is as follows: The suture is dark, very narrowly at scutellum but immediately widened and then gradually narrowed to apex. In addition there is a posthumeral angulated transverse spot which fails to reach either suture or lateral margin, a postmedian angulated transverse band which reaches the lateral margin but not the suture, and a subapical, nearly round spot. The underparts are light brown, regardless of the extent of pigmentation of the upper surface. In the

variety *unifasciata* Weise, the posthumeral and postmedian spots are joined to form a broad dark band across combined elytra from lateral margin to lateral margin. The apical spot remains discrete. Genitalia as figured. The extraordinarily long and contorted sperm duct is noteworthy.

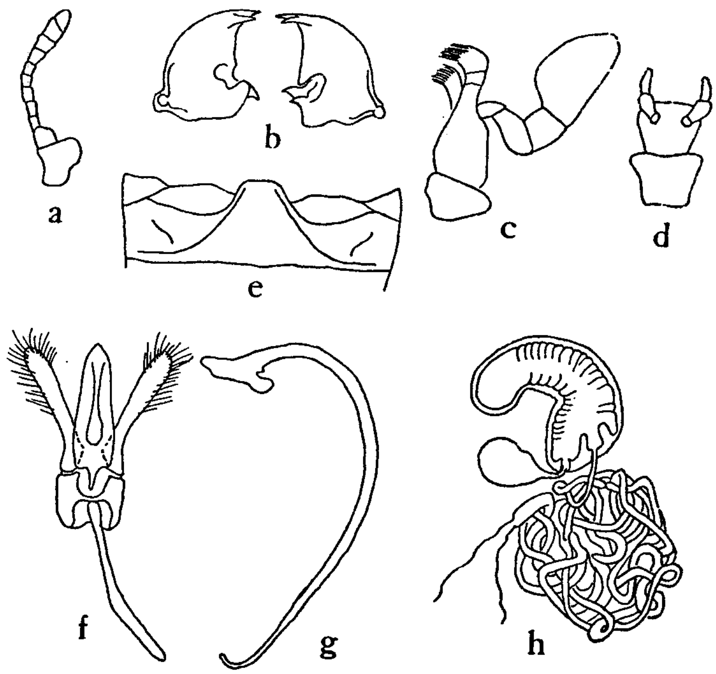


FIGURE 21.—*Menochilus sexmaculatus:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite; **f**, tegmen; **g**, sipho; **h**, receptaculum seminis.

DISTRIBUTION: India, China, Malaya, New Guinea, Caroline Is.

PALAU. ANGAUR: Jan. 1953, Beardsley, two specimens of variety *unifasciata* Weise.

Genus **Olla** Casey

Olla Casey, 1899, New York Ent. Soc., Jour. **7**: 84, 93 (type: *Coccinella abdominalis* Say, type by subsequent designation of Korschefsky, 1932).

Body broadly oval, rather strongly convex, glabrous. Antenna 11-segmented, moderately long, basal segment twice as long as broad, not conspicuously stout, second segment slightly longer than broad, barrel-shaped, third, fourth, and fifth segments subcylindrical, third and fourth nearly equal, fifth slightly shorter, sixth through ninth segments nearly equal, eighth somewhat, ninth more strongly widened apically, ninth, tenth, and eleventh segments forming an obtriangular club. Terminal segment of

maxillary palp strongly securiform; that of labial palp cylindro-acuminate. Prosternum not produced anteriorly, prosternal lobe not carinate. Abdomen with six visible sternites. Coxal arc incomplete, approaching posterior margin of sternite and ending well before reaching lateral margin. Tibial spurs present. Tarsus 4-segmented. Claw with a squarish basal tooth. Elytral epipleura moderately broad, concave, strongly descending externally. Male: aedeagus symmetrical; female: receptaculum seminis with ramus feebly developed. Infundibulum absent. Hemisternites of blade-and-handle type.

Olla is a small genus of the New World, one species of which has been introduced (intentionally?) to Guam.

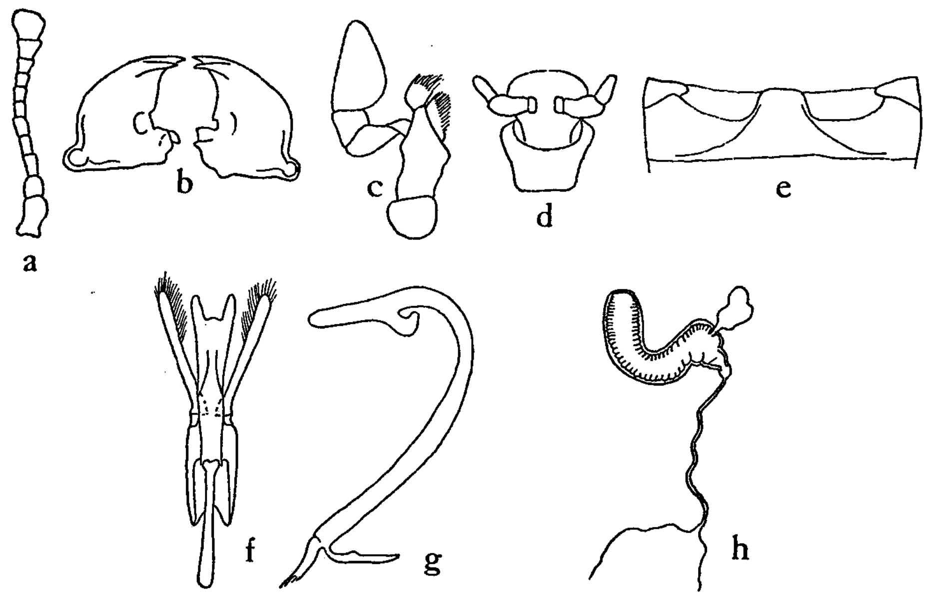


FIGURE 22.—*Olla abdominalis:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite; **f**, tegmen; **g**, sipho; **h**, receptaculum seminis.

18. Olla abdominalis (Say) (fig. 22).

Coccinella abdominalis Say, 1824, Acad. Sci. Philadelphia, Jour. **4**: 95.
Daulis abdominalis (Say), Mulsant, 1850, Spec. Trim. Sécurip., 316.
Cycloneda abdominalis (Say), Crotch, 1874, Revis. Coccinellidae, 163.
Olla abdominalis (Say), Casey, 1899, New York Ent. Soc., Jour. **7**: 93.

Length: 4.3-5.5 mm. Underparts, including legs, pale reddish brown except for whitish epimera and episterna of mesothorax and metathorax. Upper parts pale yellowish brown, decorated with piceous-black spots. Punctation extremely fine. Head pale, immaculate. Pronotum with seven spots, three small, roundish, near posterior angles and just before scutellum and four larger, two quadrate on basal margin midway between scutellar spot and posterior angle and two oblong, obliquely placed on disc and forming, with scutellar spot, a Y. Scutellum pale. Each elytron with eight spots, as follows: four in a row at the level of humeral callus, three in a row at middle

of length, outer spot just touching lateral margin, inner remote from suture, and a single spot at apical fourth near to but not touching lateral margin. Genitalia as figured.

DISTRIBUTION: North America, Central America, and northern South America, introduced to Guam.

S. MARIANA IS. GUAM: One, Agana, Feb. 1952, Maehler.

HOST: Not recorded but probably Aphididae.

Genus **Coccinella** Linnaeus

Coccinella L., 1758, Syst. Nat. ed. **10**: 364.—Mulsant, 1850, Spec. Trim. Sécurip., 93.—Crotch, 1874, Revision, 105 (type: *Coccinella 7-punctata* L., type by subsequent designation by Crotch, 1874).

Body oval to nearly circular, strongly convex, glabrous. Antenna 11-segmented, basal segment stout, twice as long as broad, second segment globose, third to eighth segments longer than broad and not as wide as second, eighth through eleventh segments forming an obtriangular club. Terminal segment of maxillary palp securiform, of labial palp small, cylindro-acuminate. Mandible with subapical lateral tooth. Prosternum not produced anteriorly, prosternal carinae parallel, reaching about halfway to anterior margin. Mesosternum not notched anteriorly. Metasternal lobe rounded. Abdomen with six visible sternites. Coxal arc on first abdominal sternite reaches posterior margin of sternite and follows it to lateral margins. The enclosed area divided by an oblique ridge. Tibial spurs present. Tarsus 4-segmented. Claws with broad basal tooth. Epipleura moderate, horizontal. Male: aedeagus symmetrical; female: receptaculum seminis with nodulus, ramus, and cornu well developed, sperm duct short, infundibulum present. Hemisternites of blade-and-handle type.

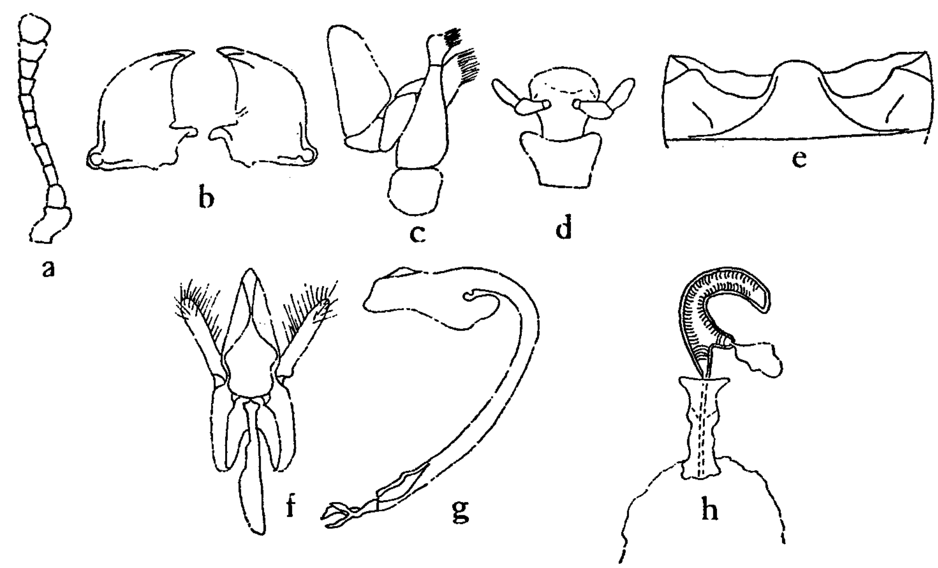


FIGURE 23.—*Coccinella 7-punctata:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite; **f**, tegmen; **g**, sipho; **h**, receptaculum seminis.

A moderately large genus, mostly of Palaearctic species. Two species have been taken in Micronesia. They may be separated as follows:

Elytra together with seven, more or less round, black spots..................**19. C. 7-punctata**
Elytra each with a large trilobed humeral spot, a transverse band at apical third and a second, usually incomplete, band just before apex, black........**20. C. repanda**

19. Coccinella 7-punctata Linnaeus (fig. 23).

Coccinella 7-punctata Linnaeus, 1758, Syst. Nat., ed. **10**: 365 (Europe; type ?).

Coccinella brucki Mulsant, 1866, Acad. Soc. Lyon, Mem. **15**: 90 (Japan; type probably at Lyon).

Length: 6-8 mm. Black, elytra reddish yellow with black spots. Punctation even, fine, and dense. Head black with a small whitish spot adjacent to each eye. Pronotum black with a quadrate whitish spot in each anterior angle. Scutellum black. Elytra with a common spot surrounding scutellum, and each with three roundish spots, one at middle of length and near suture, one near basal third and near lateral margin, and one subapical, near lateral margin. Underparts black except for mesepisterna which are pale. Genitalia as figured.

DISTRIBUTION: Of the species, Palaearctic region; of the variety, Japan, China, India, Volcano Is.

VOLCANO IS. Iwo JIMA: Feb.-Mar. 1945, Haringa, Hutzel.

Two specimens seen. Probably this form has been recently introduced from Japan where it is common.

The only specimens seen from Micronesia belong to the variety *Coccinella 7-punctata* var. *brucki* Mulsant, which differs from the typical form only in the larger size of the elytral spots. There are many intermediates between the two forms.

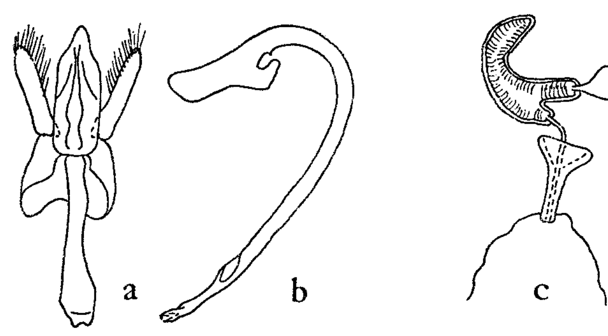


FIGURE 24.—*Coccinella repanda:* **a**, tegmen; **b**, sipho; **c**, receptaculum seminis.

20. Coccinella repanda Thunberg (fig. 24).

Coccinella repanda Thunberg, 1781, Nov. Ins. Spec. **1**: 18, fig. 25 ("Cape of Good Hope"; type?).

Length 3.7-7 mm. Black, elytra reddish yellow with black markings. Punctation extremely fine, hardly visible under moderate power, the surface appearing polished. Head black with small whitish spots adjacent to each eye; rarely are these spots connected across front. Pronotum as in *C. 7-punctata* L. Scutellum black. Elytra with a common spot surrounding scutellum, and each with a large trilobed spot centered on humeral callus, a transverse band at apical third which joins its counterpart at suture but fails to reach lateral margins, and two smaller spots near apex, one sutural and one lateral, which occasionally join to form a band. Underparts black except for mesepisterna and metepisterna which are pale. Genitalia as figured.

DISTRIBUTION: South Africa ?, India, China, Australia, New Zealand, and southwest Pacific Islands. Specimens seen: 75.

N. MARIANA IS. AGRIHAN: July 1949-1951, R. Bohart, Langford, Mead.

S. MARIANA IS. SAIPAN, TINIAN, ROTA, GUAM: Mar.-Dec., 1936-1952, Beardsley, Dybas, Fullaway, Hadden, Krauss, Matusita, Swezey, Townes, Usinger.

PALAU. BABELTHUAP, PELELIU, ANGAUR, NGERKABESANG: Feb., Apr.-May, July-Aug., Dec. 1945-1949, Dybas, Langford, Townes.

YAP. YAP: July 1946, Oakley.

CAROLINE ATOLLS. ULITHI: Mogmog I., July, Oct. 1946-1952, Krauss, Oakley.

MARSHALL IS. LIKIEP: Likiep I.; KWAJALEIN: Bennett I., Berlin I., Ebeye I.; AILINGLAPALAP: Bigatyelang I.; MAJURO, ARNO: Ine I., Jan., June-Aug., 1944-1945, 1946, 1950, La Rivers, Oakley, Usinger, Wallace.

GILBERT IS. ONOTOA: Buiartum I., July 1951, Moul.

OCEAN I., Dec. 1957, Krauss.

HOSTS: Various Aphididae, etc.

Genus **Synharmonia** Ganglbauer

Synharmonia Ganglbauer, 1899, Käfer Mitteleuropa **3** (2): 1002.—Dobzhansky, 1925, Zool. Anzieger **62**: 247, figs. 1, *c*, 2, *c*. (Type: *Coccinella conglo-*

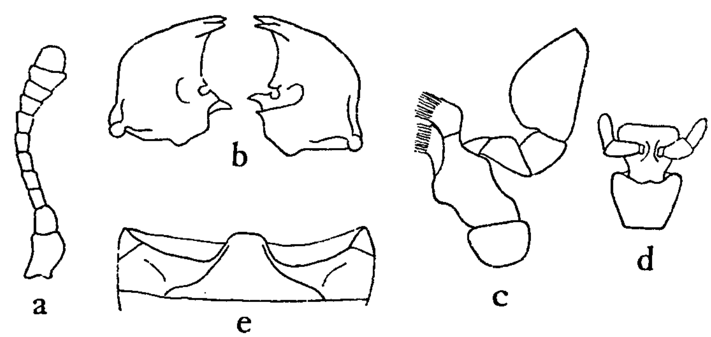


FIGURE 25.—*Synharmonia conglobata:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite.

bata L., type by present designation; Palaearctic region.)

Protocaria Timberlake, 1943, Hawaiian Planters' Rec. 47 (1): 28, 56 (type: *Protocaria scalaris* Timberlake, monobasic; Formosa, Japan).

Body oval, moderately convex, glabrous. Antenna 11-segmented, basal segment stout, slightly curved, 1.5 times longer than broad, second segment slightly longer than broad, barrel-shaped but slightly narrower at apex than at base, third through sixth segments nearly equal, cylindrical, 1.5 times longer than broad but only half as broad as second segment, seventh and eighth segments subequal, trapezoidal, broader apically, eighth through eleventh segments forming a compact club, tenth widest, the eleventh broadly rounded apically. Terminal segment of maxillary palp broadly securiform, that of labial palp slender cylindro-acuminate. Mandible with subapical lateral tooth. Prosternum not produced anteriorly, prosternal lobe carinate. Mesosternum weakly emarginate anteriorly. Abdomen with six visible sternites. Coxal arc flows into posterior margin of sternite, the enclosed space with oblique line. Tibial spurs present. Tarsus 4-segmented. Claw with obtuse basal tooth. Male: aedeagus symmetrical; female: receptaculum seminis with nodules small but distinct, ramus bulbous on a slender stalk, cornu as long as entire ramus, sperm duct short, infundibulum present, hemisternites of blade-and-handle type.

This genus contains a few species distributed over the entire Palaearctic region. One species occurs in Micronesia.

21. Synharmonia scalaris (Timberlake) (fig. 26).

Protocaria scalaris Timberlake, 1943, Hawaiian Planters' Rec. 47 (1): 29, pl. 1, fig. 16 (Formosa, Japan; type in U. S. Nat. Mus.).

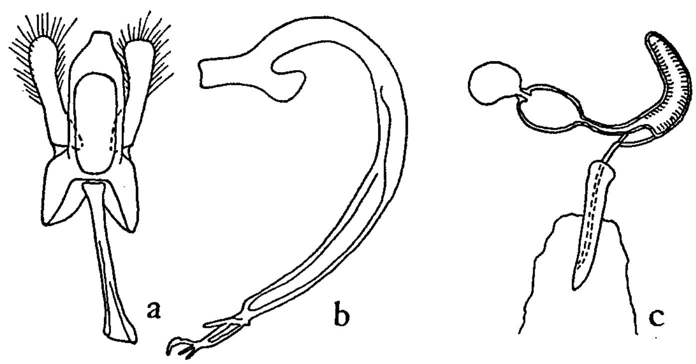


FIGURE 26.—*Synharmonia scalaris:* **a**, tegmen; **b**, sipho; **c**, receptaculum seminis.

Length 3-4 mm. Above testaceous yellow, heavily marked with black, beneath black except for mesepimera and legs. Head with vertex black, lines of demarcation between light and dark bisinuate. Mouthparts and antennae pale. Pronotum dark with a large, almost quadrate, pale spot in each anterior angle, the spots connected narrowly across anterior margins and extended along lateral margins narrowly to basal angles. At middle of anterior margin, pale color is extended backward about one-third of length of pronotum as a narrow spur. Scutellum black. Elytra each with lateral margin and a series of three pale discal spots. Of the three spots, the first is basal and

subtriangular, the second slightly before the middle and oval and the third is at apical fourth and round. The middle spot is the largest. Pale lateral margin is undulate within, being wider at base, middle of length, and just before apex. Pale area fails to reach sutural angle. Elytral epipleura pale. Abdomen with fifth sternite broadly emarginate in male, broadly rounded in female. Genitalia as figured.

DISTRIBUTION: Formosa, Japan, Bonin Is. Specimens seen: 9.

BONIN IS. ANI JIMA: North end, July 1949. CHICHI JIMA: Tsurihama, June 1949; both lots by Mead.

HOST: Not recorded, taken on pine.

While the receptaculum seminis of this species is almost identical with that of *S. conglobata* (L.), the two species are easily distinguished by the color pattern and the conformation of the median lobe of the aedeagus.

Genus **Harmonia** Mulsant

Harmonia Mulsant, 1846, Hist. Nat. Coléop. France, Sécurip., 108 (type: *Coccinella marginepunctata* Schaller, type by subsequent designation of Timberlake, 1943).

Ptychanatis Crotch, 1874, Revis. Coccinellidae, 122 (type: *Coccinella axyridis* Pallas, type by original designation).

Closely related to *Coccinella.* Body broadly elongate to oval, not notably convex. Head structures and prosternum much as in *Coccinella.* Mesosternum feebly notched anteriorly. Abdomen with six visible sternites. Coxal arc on first abdominal sternite fails to reach posterior margin of sternite but turns sharply anteriorly to join oblique ridge. Tibial spurs absent. Tarsus 4-segmented. Epipleura as in *Coccinella.* Male: aedeagus symmetrical; female: receptaculum with nodulus and cornu well developed, ramus not developed; sperm duct short, infundibulum present. Hemisternites of the blade-and-handle type.

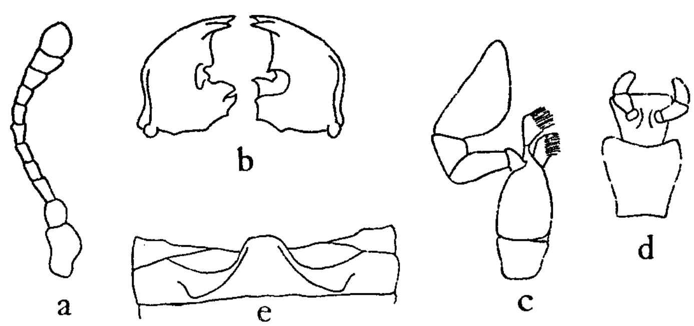


FIGURE 27.—*Harmonia quadripunctata:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite.

This genus of a few species, mostly Palaearctic, is evidently a segregate of *Coccinella* and is considered as a subgenus of *Coccinella* by many. The con-

sistent differences in the female genitalia, as well as such differences in the mesosternal lobe and metacoxal arcs and the absence of tibial spurs seem to the writer adequate reasons for separating the two genera. Two species of *Harmonia* have been taken in Micronesia.

Elytra usually each with a transverse plica just before apex; color pattern very variable, ranging from black with one or more reddish-yellow spots on each elytron to reddish yellow with black spots or markings........................**22. H. axyridis**

Elytra never with subapical plica; each elytron usually with three transverse rows of black spots and an apical black spot on a reddish-yellow background, the spots frequently coalescing........................**23. H. arcuata**

22. Harmonia axyridis (Pallas) (fig. 28, *a-c*).

Coccinella axyridis Pallas, 1773, Reise Russ. Reich., 726 (Jenisseisk, type ?).

Leis axyridis (Pallas) Mulsant, 1850, Species Trim. Sécurip., 266.

Ptychanatis axyridis (Pallas) Crotch, 1874, Revis. Coccinellidae, 123.

Coccinella (*Harmonia*) *axyridis* (Pallas) Weise, 1885, Best.-Tab., II, ed. 2:35.

Harmonia axyridis (Pallas) Timberlake, 1943, Hawaiian Planters' Rec. **47**: 17.

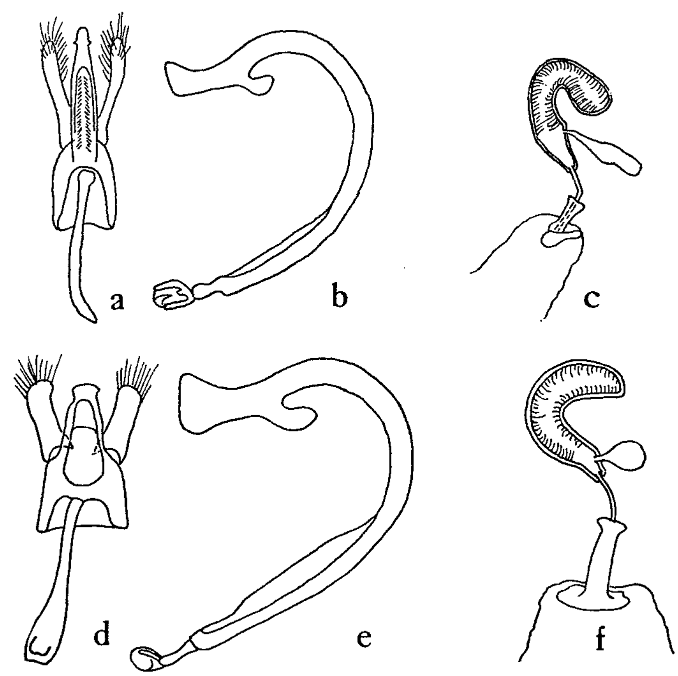


FIGURE 28.—**a-c,** *Harmonia axyridis: a,* tegmen; *b,* sipho; *c,* receptaculum seminis. **d-f,** *H. arcuata: d,* tegmen; *e,* sipho; *f,* receptaculum seminis.

Length: 6-7 mm. Underparts and legs reddish yellow, above either reddish yellow with black markings, or black with reddish-yellow markings. Head yellowish or black with two yellowish spots on vertex. Pronotum black with lateral margins broadly pale or pale with black spots (usually four) on disc. Scutellum black. Elytra ranging from black, each with a single pale spot on disc to entirely pale. The most common pale form has 19 small spots as follows: a scutellar spot common to both elytra, and 9 spots on each arranged roughly in transverse rows, 2-3-3-1. The most common dark form has a large transversely oval spot on basal half and a smaller, more rounded spot in apical angle. All imaginable intergrades occur. Pronotum and elytra finely and densely punctured. Transverse plica usually is present a short distance before apex; specimens have been seen with plica on one elytron only or with plica completely absent. Underparts pale, abdominal sternites slightly darker in median third. Genitalia as figured.

DISTRIBUTION: Eastern Siberia, Manchuria, China, Korea, Japan, Ryukyu Is., Bonin Is. Specimens seen: 6.

BONIN IS. CHICHI JIMA: Six, May-June, 1958, Snyder.

This species may have been introduced recently from Japan.

23. **Harmonia arcuata** (Fabricius) (fig. 28, *d-f*).

Coccinella arcuata Fabricius, 1787, Mant. Ins. 1: 55 (China; type?).

Coccinella octomaculata Fabricius, 1781, Spec. Ins., 97 (not *octomaculata* Thunberg, 1781).

Harmonia arcuata (Fabricius) Mulsant, 1850, Spec. Trim. Sécurip., 77.

Length: 5.5-7 mm. Underparts, except margin of abdomen, and femora dark, margin of abdomen, tibiae, tarsi, mouthparts, antennae reddish yellow, pronotum and elytra with black markings. Front of head reddish yellow, vertex black. Pronotum reddish yellow with a quadrate black spot on disc. This spot is composed of four spots more or less coalesced, or pronotum is entirely pale. Scutellum black. Elytra usually with suture and each with nine spots as in the 19-spotted forms of *H. axyridis*, except that the spots have coalesced transversely to form three bars and an apical spot. In certain localities the basal and antemedian bars are absent. Pronotum and elytra finely and densely punctured. Genitalia as figured.

DISTRIBUTION: India, China, islands from Taiwan to New Guinea, Australia, and parts of Micronesia. Specimens seen: 130.

N. MARIANA IS. AGRIHAN: July 1949-1951, R. Bohart, Langford, Mead.

S. MARIANA IS. SAIPAN, TINIAN, ROTA, GUAM: Jan., Mar.-Aug., Oct.-Nov., 1936-1948, Bryan, Dybas, Ducoff, Kondo, Lange, Langford, Maehler, Matusita, Oakley, Swezey, Usinger.

MARSHALL IS. ENIWETOK, UJELANG, BIKINI, WOTHO, UJAE, RONGELAP, TAKA, JEMO, KWAJALEIN, AILINGLAPALAP, JALUIT, WOTJE, POKAK, BIKAR, MAJURO, ARNO: Jan., May-Dec. 1933-1953, Allen, Beardsley, Esaki, Fosberg, La Rivers, Townes, Uchiyama, Wallace.

GILBERT IS. BUTARITARI, TARAWA: Mar., July-Aug., Nov.-Dec. 1951-1957, Brown, Catala, Krauss, Moul.

HOSTS: Various Aphididae, etc.

The apparent absence of this species from the Carolines seems noteworthy.

Genus **Verania** Mulsant

Verania Mulsant, 1850, Spec. Trim. Sécurip., 343, 358.—Crotch, 1874, Revis. Coccinellidae, 175 (type: *Coccinella comma* Thunberg, type by subsequent designation by Crotch, 1874).

Body oval, convex, glabrous. Antenna 11-segmented, first segment stout, about twice as long as broad, second segment barrel-shaped, half as long as first, third through seventh segments slender, each slightly shorter than the preceding, eighth through eleventh forming a compact, fusiform club, the eleventh segment half again as long as the tenth, subconical. Terminal segment of maxillary palp securiform, that of labial palp cylindro-acuminate, truncate. Mandible with lateral tooth subapical in position. Prosternum not produced anteriorly, prosternal lobe carinate, carinae not

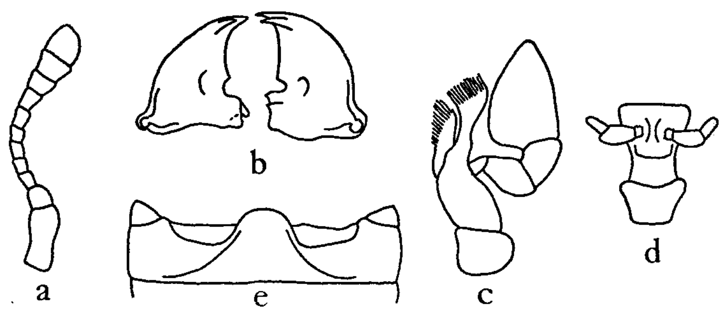


FIGURE 29.—*Verania discolor:* **a,** antenna; **b,** mandibles; **c,** maxilla; **d,** ligula; **e,** first abdominal sternite.

reaching beyond middle of prosternum. Abdomen with six visible sternites. Coxal arc incomplete, curving almost into posterior margin and failing to reach lateral margin of segment. Tibial spurs absent. Tarsus 4-segmented. Claw with a broad, squarish, basal tooth. Elytral epipleura moderately broad, concave, weakly descending externally, not excavate for reception of tips of femora. Male: aedeagus symmetrical; female: receptaculum seminis with well-developed ramus and cornu, nodulus feebly indicated, infundibulum strongly developed. Sperm duct short. Hemisternites of the blade-and-handle type.

A genus of about a dozen species from Africa, India, China, Japan, Philippine Islands, Indonesia, and Australia. One species possibly, but not probably, occurs on Guam. See Appendix for discussion.

Genus **Pharellus** Sicard

Pharellus Sicard, 1928, Ann. Mag. Nat. Hist. X, **1**: 300 (type: *Pharellus minutissimus* Sicard, monobasic).

Body oval to nearly circular, moderately to strongly convex, pubescence variable. Antenna 10-segmented, basal segment stout, twice as long as broad, second segment barrel-shaped, only slightly longer than broad. Third segment as long as second but only half as wide, fourth through seventh segments each shorter than broad, eighth

through tenth segments forming a compact, oval club. Terminal segment of maxillary palp elongate, subcylindrical, slightly acuminate, of labial palp very small, cylindrical, apically rounded. Mandible simple, without lateral tooth. Prosternum not produced anteriorly, prosternal carinae absent, prosternal lobe at its apex widely extended, completely closing anterior coxal cavities. Mesosternum transverse anteriorly. Abdomen with six visible sternites. Coxal arcs on first abdominal sternite variable, suture between the first and second visible sternites completely effaced, as viewed by reflected light, barely traceable when viewed by transmitted light. Tibial spurs absent. Tarsus 4-segmented, claws slightly thickened at base. Epipleura wide in basal half, slightly or, in one species, strongly concave. Male: aedeagus strongly asymmetrical, parameres greatly reduced in size or absent; female: receptaculum seminis of unusual shape, not clearly differentiated into nodulus, ramus, and cornu, sperm duct short, infundibulum present or absent, hemisternites elongate triangular, the pair serving as an ovipositor.

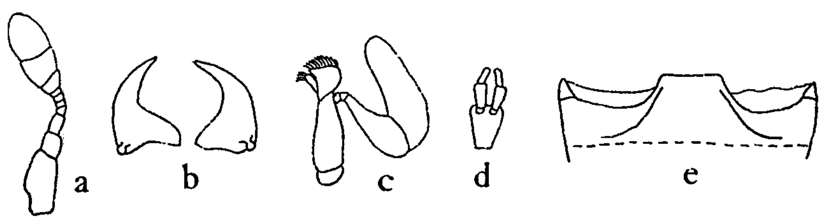


FIGURE 30.—*Pharellus ponapensis:* **a,** antenna; **b,** mandibles; **c,** maxilla; **d,** ligula; **e,** first abdominal sternite.

A small genus of minute species, known from various islands of the southwest Pacific. The type species, *P. minutissimus* Sicard, was described from Java. In the original description the author indicated uncertainty as to the number of antennal segments. The various species before me agree in having 10-segmented antennae; otherwise they agree in characters with Sicard's description.

Because of the very small size, the uniform shape, and lack of distinctive color patterns, it is very difficult to separate the various species on external characters alone. Therefore, where the material available warranted, specimens have been dissected, the parts cleared and mounted in balsam. As far as possible, the key to species which follows is based on characters that may be seen on normally mounted specimens. Supplemental characters based on the study of the balsam mounts are added and it must be borne in mind that these last mentioned characters are of more significance than most of the external characters. The most important characters noted in the study of the balsam mounts are the internal genitalia, the pores found in the abdominal sternites, and the form of the coxal arcs on the first abdominal sternite.

Species of *Pharellus* found up to this time in Micronesia may be separated by the following key:

1. Pronotum finely and ratherly densely punctured; pubescence sparsely but evenly distributed over dorsal surface 2
   Pronotum virtually impunctate; pubescence very sparse, mostly confined to lateral margins of pronotum and elytra 4

2(1). Elytra densely and confusedly punctate, lateral margins sharply reflexed; parameres represented by clusters of bristles arising near base of median lobe, sipho comparatively short, trabes long and slender; coxal arcs closely following contour of coxal cavity, but broken near middle; pores on first and second sternites minute, sparse.......**24. setosus**

Elytra sparsely punctate, punctures relatively coarse, lateral margins not noticeably reflexed, coxal arcs curving into almost obliterated suture and reaching lateral margin.......3

3(2). First and second sternites sparsely set with small, circular pores; parts of receptaculum seminis rounded without lateral processes.......**25. yapensis**

First and second sternites more densely set with moderately coarse, transversely oval pores; parts of receptaculum with strong lateral processes.......**26. villosus**

4(1). Form very convex; metasternum not set with conspicuously large punctures; elytra extremely finely punctured; coxal arcs curving into and following almost obliterated suture nearly to lateral margin.......**27. calvus**

Form normally convex; metasternum usually set with a few large punctures; coxal arcs variable.......5

5(4). Punctation of elytra moderately dense and uniform; parameres short and thick, each with a cluster of bristles, usually four; sipho short with attenuated tip; trabes long and slender.......**28. ponapensis**

Punctation variable but always stronger in basal half of elytron; parameres and bristle clusters wanting, sipho long, apical portion extremely fine; trabes shorter, and ending in a broad, flat, paddle-shaped apex.......6

6(5). Punctation of elytra rather sparse and relatively coarse; pores on first and second abdominal sternites with circular openings above conspicuous subsurface glands; the pores on second sternite in a single row of about 20.......**29. palauensis**

Pores on second sternite in two or more rows at middle of sternite; punctation of elytra more dense.......7

7(6). Punctation of elytra moderately dense and coarse over basal four-fifths; pores on second sternite very small and circular, not backed by visible subsurface glands, numerous and arranged in two or three rows; coxal arcs wanting.......**30. guamensis**

Pores on second sternite in form of transverse slits, each backed by an oblong subsurface gland; coxal arcs present, curving into almost obliterated suture and extending almost to lateral margin.......**31. dybasi**

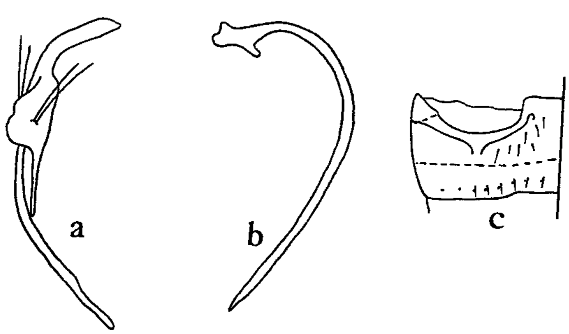


FIGURE 31.—*Pharellus setosus:* **a,** tegmen; **b,** sipho; **c,** first and second abdominal sternites.

24. Pharellus setosus Chapin, n. sp. (fig. 31).

Length: 0.90-1.10 mm. Upper surface shining, piceous black; under parts and legs dark castaneous; mouthparts and tarsi yellow brown. Pubescence extremely fine, erect, more dense than in following species, evenly distributed. Pronotum with posterior angles effaced, not margined basally, lateral margins narrowly reflexed. Elytral epipleura relatively broad, flat, not excavate for reception of femora, gradually narrowing from level of hind coxae to apical fifth. Legs short, femora stout, tibiae simple. Male genitalia as figured.

Holotype, male (BISHOP 6115), Pis I., Truk Is., Feb. 16, 1954, Beardsley. Four paratypes (BISHOP, US): Three same data as holotype; one (KU), Truk, Tol I., Apr. 1940, Yasumatsu and Yoshimura.

DISTRIBUTION: Caroline Is. (Truk). Specimens seen: 7.

HOST: Not recorded.

With the type series I have associated a specimen from Nomwin Atoll, Fananu I., Feb. 1954, Beardsley, and a specimen from Satawal I., Sept. 1952, Krauss.

25. Pharellus yapensis Chapin, n. sp. (fig. 32, *a, b*).

Length: 0.90-1.05 mm. Upper surface strongly shining, deep piceous black; front of head, under parts, and legs dark castaneous; mouthparts yellow brown. Pubescence sparse and erect, evenly distributed over upper surface. Pronotum with posterior angles effaced, not margined basally or laterally. Elytral epipleura flat, not excavate for reception of femora, gradually narrowing from level of hind coxae to apical fourth. Legs short, tibiae simple, femora slightly inflated, posterior pair more distinctly so. Receptaculum seminis as figured.

Holotype, male (US 66334), Gagil I., Yap Is., July 14, 1946, Oakley. Three paratypes (US, BISHOP): Kolonia, Yap, Mar. and Apr. 1954, Beardsley; Yap I., July 1951, Gressitt.

DISTRIBUTION: Caroline Is. (Yap). Specimens seen: 4.

HOST: Associated with *Aspidiotus* sp. on coconut.

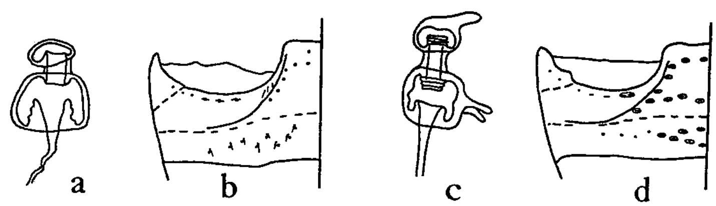


FIGURE 32.—**a, b,** *Pharellus yapensis: a,* receptaculum seminis; *b,* first and second abdominal sternites. **c, d,** *P. villosus: c,* receptaculum seminis; *d,* first and second abdominal sternites.

26. Pharellus villosus Chapin, n. sp. (fig. 32, *c, d*).

Length: 0.80-0.98 mm. Upper surface shining, dark castaneous, except head and sometimes also pronotum bright castaneous, under parts castaneous, mouthparts and

legs pale yellowish brown. Pubescence fine, erect, rather sparse, but evenly distributed. Pronotum with posterior angles broadly rounded, not margined basally or laterally. Elytral epipleura somewhat concave, moderately wide, not excavate for reception of femora, gradually narrowing from level of posterior coxae to apical third. Legs short and stout, tibiae simple. Male genitalia not seen. Receptaculum seminis as figured.

Holotype, male? (US 66335), W. of Ulimang, Babelthuap I., Palau Is., Dec. 21, 1947, Dybas. Six paratypes (CM, US, BISHOP): Babelthuap I., Ulimang, Dec. 1947, Dybas; Aurapushekaru I., Jan. 1948, Dybas; Peleliu I., east coast, Aug. 1945, Dybas.

DISTRIBUTION: Caroline Is. (Palau). Specimens seen: 7.

HOST: Not recorded, beaten from vegetation.

27. Pharellus calvus Chapin, n. sp.

Length: 1.0-1.12 mm. Upper surface deep castaneous; underparts bright castaneous, mouthparts and legs yellow brown. Pubescence extremely fine and quite short, sparsely distributed on pronotum and along lateral margins of elytra. Pronotum with posterior angles broadly rounded, not margined basally, lateral margins narrowly reflexed. Elytral epipleura relatively broad and slightly concave, not excavate for reception of femora, gradually narrowing from level of posterior coxae to almost apex. Legs short, femora quite stout, tibiae simple. Genitalia not studied.

Holotype, female (BISHOP 6116), Mt. Unibot, Tol I., Truk Is., Jan. 4, 1953, Gressitt. Paratype (US): one female, same data as holotype.

DISTRIBUTION: Caroline Is. (Truk). Specimens seen: 2.

HOST: Not recorded, taken in native forest.

The very convex form and the extremely fine punctation of the elytra distinguish this species from all others that I have seen.

28. Pharellus ponapensis Chapin, n. sp. (figs. 30; 33, *a-d*).

Length: 0.84-1.12 mm. Upper and under surfaces deep piceous black; legs light castaneous brown; mouthparts and tarsi yellow brown. Pubescence extremely fine, restricted to a few erect hairs scattered over pronotum and a thin line of hairs along lateral margins of elytra. Pronotum with very obtuse posterior angles, not margined basally or laterally. Elytral epipleura narrow, flat, not excavate, gradually narrowing from level of hind coxae to apical fifth. Legs short, femora moderately stout, tibiae simple. Male genitalia as figured. Receptaculum seminis apparently absent but actually present, weakly sclerotized but completely unpigmented, as figured.

Holotype, male (US 66336), summit of Mt. Kupuriso, about 600 m., Ponape I., Mar. 8, 1948, Dybas. Paratypes, 22 males and females (US, BISHOP, CM, MCZ): Four paratopotypes; Mt. Kupuriso, north slope, about 300-450 m., Mar. 1948, Dybas; Mt. Nanalaud, southeast slope, about 300 m., Mar. 1948, Dybas; Mt. Nanalaud, about 600 m., Mar. 1948, Dybas; Nanpil, Nett District, Feb. 1948, Dybas; Mt. Temwetemwensekir, 100 m., Jan. 1953, Gressitt; 420 m., June-Sept. 1950, Adams; Mt Beirut, 660 m., June-Sept. 1950, Adams; one, Peipalap Pk., 240 m., June-Sept. 1950, Adams.

DISTRIBUTION: Caroline Is. (Ponape). Specimens seen: 23.

HOST: Not recorded, swept from vegetation.

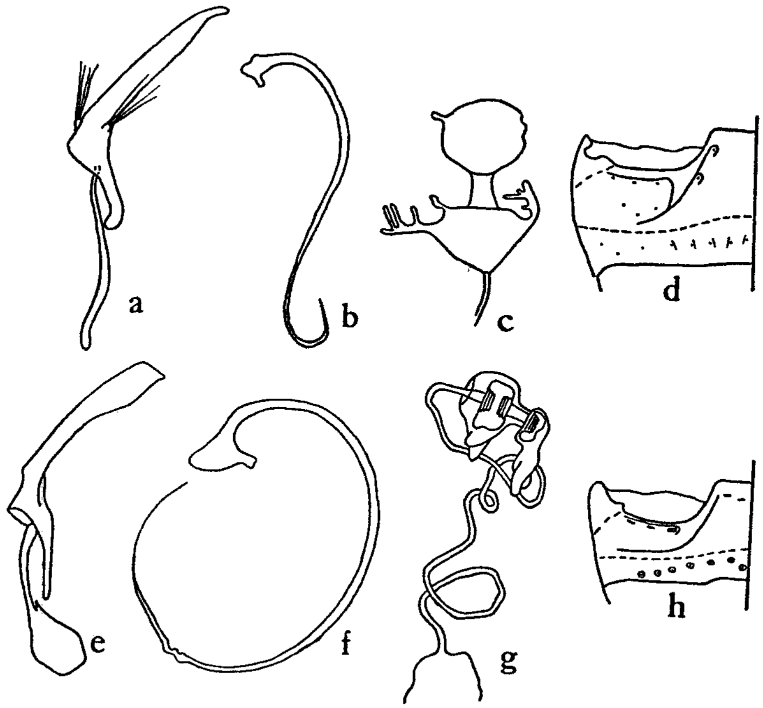


FIGURE 33.—**a-d**, *Pharellus ponapensis: a*, tegmen; *b*, sipho; *c*, receptaculum seminis; *d*, first and second abdominal sternites. **e-h**, *P. palauensis: e*, tegmen; *f*, sipho; *g*, receptaculum seminis; *h*, first and second abdominal sternites.

29. **Pharellus palauensis** Chapin, n. sp. (fig. 33, *e-h*).

Length: 0.84-0.95 mm. Pronotum and elytra deep piceous black, front of head between and below eyes, mouthparts, and legs reddish yellow, under parts castaneous to piceous. Pubescence restricted to a single row of short, reect hairs along lateral margins of elytra and prothorax. Pronotum with posterior angles effaced, not margined basally or laterally. Elytral epipleura rather broad, flat, rather abruptly narrowing between level of posterior coxae and apical third. Legs short and stout, tibiae simple. Male genitalia as figured. Receptaculum seminis much as in *P. dybasi.*

Holotype, male? (BISHOP 6117), Koror I., Palau Is., Jan. 10, 1954, Beardsley. 46 paratypes (US, CM, BISHOP): 13 paratopotypes; Koror, Jan. 1953, Jan.-Mar. 1954, Beardsley. Koror, Nov. 1947, Dybas; Koror, limestone ridge, N. of inlet, Jan. 1948, Dybas; same locality, S. of inlet, Jan. 1948, Dybas; same locality, 40 m. alt., Dec. 1952, Gressitt.

Other specimens: 12, Babelthuap I., Dec. 1947, Dybas; two, Angaur I., Feb. 1948, Dybas; two, Peleliu I., Dec. 1952, Gressitt, and Jan. 1948, Dybas; one, Garakayo I., Aug. 1945, Dybas; one, Ngiramaous I., Nov. 1947, Dybas, and one, Aurapushekaru I., Jan. 1948, Dybas.

DISTRIBUTION: Caroline Is. (Palau). Specimens seen: 66.
HOST: Taken on coconut infested with *Furcaspis* sp.

30. Pharellus guamensis Chapin, n. sp. (fig. 34, *a-c*).

Length: 0.98-1.20 mm. Upper surface shining, deep piceous black, mouthparts and legs deep castaneous, tibiae slightly lighter in color. Pubescence restricted to lateral margins of elytra and pronotum, with a very few scattered hairs on upper surface. Pronotum with obtuse posterior angles, not margined basally or laterally. Elytra epipleura comparatively narrow, flat, not excavate for tips of femora, and narrowing abruptly between level of posterior coxae and basal three-fifths. Legs short and stout, tibiae simple. Male genitalia and receptaculum seminis as figured.

Holotype, male? (BISHOP 6118), Mt. Alifan, Guam, S. Mariana Is., Apr. 1946, Krauss. 18 paratypes (BISHOP, US, CM): one, D. T. Fullaway; two, Pt. Ritidian, June 1945, Gressitt and G. Bohart; one, Mt. Lamlam, Oct. 1957, Krauss; two, same locality, Nov. 1952, Gressitt; two, Barrigada, June 1936, Usinger; one, Sinajana, June 1936, Usinger; one, Talofofo, June 1946, Townes; four, Pati Pt., June 1945, Dybas; two, Agana, June 1945, Dybas; two, Ritidian Pt., May 1945, Dybas.

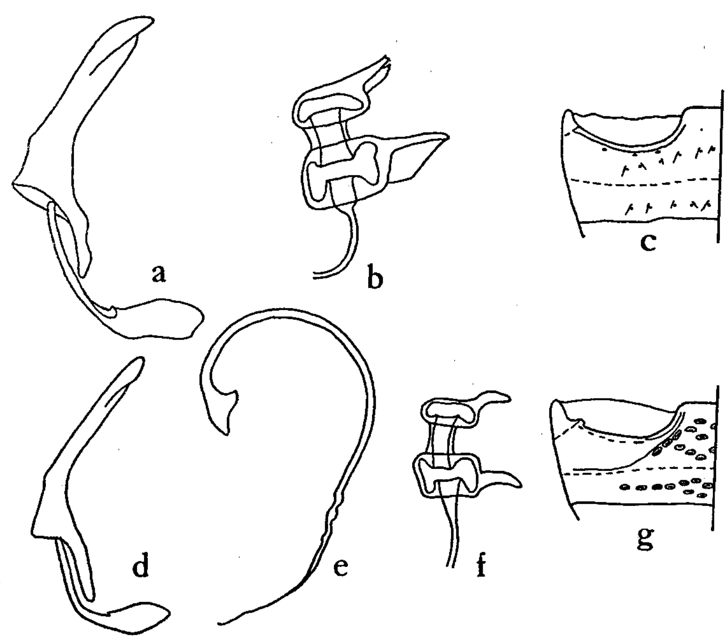


FIGURE 34.—**a-c**, *Pharellus guamensis: a,* tegmen; *b,* receptaculum seminis; *c,* first and second abdominal sternites. **d-g**, *P. dybasi: d,* tegmen; *e,* sipho; *f,* receptaculum seminis; *g,* first and second abdominal sternites.

DISTRIBUTION: S. Mariana Is. (Guam). Specimens seen: 19.
HOST: Not recorded.

31. Pharellus dybasi Chapin, n. sp. (fig. 34, *d-g*).

Length: 0.98-1.16 mm. Upper surface shining, dark castaneous, head, anterior angles of pronotum broadly, and under parts light castaneous, mouthparts and legs yellow brown. Pubescence most conspicuous along margins of elytra and pronotum, also a few short erect hairs scattered about over upper surface. Pronotum with obtuse posterior angles, not margined basally or laterally. Punctation of elytra varying from very fine to fine on basal two-thirds but always obsolescent on apical third. Elytral epipleura moderately wide, flat, not excavate, gradually narrowing from just in front of posterior coxae to apical fifth. Male genitalia and receptaculum seminis as figured.

Holotype, male (CM) and 90 paratypes, both sexes, Saipan, As Mahetog area, various dates between Nov. 1944 and April 1945, H. S. Dybas, holotype collected Apr. 22, 1945.

Other specimens. SAIPAN: Aug. 1945, Ducoff; Apr. 1945, Dybas; Papago area, Jan., May 1945, Dybas; Talofofo area, Jan.-Apr. 1945, Dybas; Halaihai-As Teo area, Jan.-Feb., 1945, Dybas; Mt. Tagpochau, 1,250 ft., Jan.-Feb., 1945, Dybas; Tuturam, Laulau Bay, Jan. 1945, Dybas; near Hagman Point, Apr. 1945, Dybas; Kalabera area, Jan. 1945, Dybas; Mt. Magpi summit, Apr. 1945, Dybas; Afetna Point, July 1946, Townes; Inai Haguman, July 1939, Esaki; Karabera, July 1939, Esaki; Garapau-Sadog Tasi, May 1940, Yasumatsu and Yoshimura. TINIAN: Mar. 1945, Dybas, Hagen; Mt. Lasso, Mar.-Apr. 1945, Dybas; ridge, s.e. section, Mar. 1945, Dybas; Marpo Valley, Oct. 1945, Dybas; n. of Gurgan Point, Apr. 1945, Dybas. ROTA: Sonson-Taipingot, Feb. 1936, Esaki. GUAM: Ritidian Point, May 1945, Dybas; Oca Point, May 1945, Dybas; Sinajana, June 1936, Swezey; Sinajana-Barrigada, Dec. 1952, Gressitt.

DISTRIBUTION: S. Mariana Is. (Saipan, Tinian, Rota, Guam). Specimens seen: 222.

HOST: Not recorded, swept from vegetation.

Genus **Ortalia** Mulsant

Ortalia Mulsant, 1850, Spec. Trim. Sécurip., 893.—Crotch, 1874, Revis. Coccinellidae, 275 (type: *Ortalia variata* Mulsant, type by subsequent designation of Crotch, 1874; Africa).

Body more or less oblong ovate, size medium to large, set with fine, short pubescence. Antenna 10-segmented, basal segment stout, half again as long as broad, straight, second segment about half as long as basal, barrel-shaped, third to seventh segments similar in shape and equal in width, the third as long as the second, fifth and sixth equal and each slightly shorter than third, fourth and seventh equal and each slightly shorter than fifth, eighth to tenth segments forming a compact club, the tenth longer and broader than ninth. Terminal segment of maxillary palp triangular, that of the unusually long and slender labial palp tapering to truncate apex. Mandible with subapical tooth. Prosternum not produced anteriorly, prosternal lobe rather broad, flat, without carinae. Abdomen with six visible sternites. Coxal arc incomplete, in a flat curve not approaching closely posterior margin of sternite, and ending near anterior

lateral angle of sternite. Tibiae simple. Tibial spurs absent. Tarsus 3-segmented. Claw bifid. Elytral epipleura flat, not foveolate, terminating shortly before apex. Male: aedeagus with asymmetrical median lobe; female: not studied.

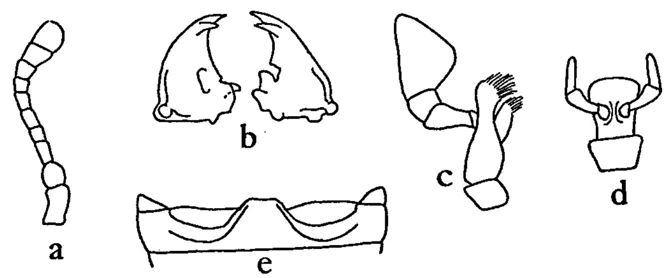


FIGURE 35.—*Ortalia maeklini:* **a,** antenna; **b,** mandibles; **c,** maxilla; **d,** ligula; **e,** first abdominal sternite.

A genus of some 40 species, largely African but with species in India and Malaya. One species has been taken on Guam.

The above diagnosis of the genus is taken from *Ortalia maeklini* Mulsant from India. Unfortunately no specimens of any of the much larger African species, which include the genotype, are available to the writer.

32. **Ortalia tricolor** Chapin, n. sp.

Length: 2.6 mm. Body form oblong oval; punctation of head extremely fine, moderately dense, that of pronotum somewhat coarser, that of elytra much coarser and relatively less dense; pubescence fine, short, and erect, rather sparse. Front of head shining, slightly concave, yellowish white. Mouth parts and antennae stramineous. Pronotum margined basally and laterally, median third pale reddish brown, lateral third yellowish white. Elytra reddish brown with a transverse piceous-black irregular blotch covering most of basal half. Basal margin of dark area is parallel to and at a slight distance from basal margins of elytra, laterally, area extends from and including humeral callus to about three-fifths of length of elytra and actually touches lateral margin for a short distance. Apical margin of area is angulate, apex of angle lying on suture at middle point of its length. Under parts of prothorax and mesothorax, legs, and abdomen pale stramineous; metasternum is reddish brown at basal third and piceous black at apical two-thirds. Claws bifid, inner part of each claw nearly as large as outer. Genitalia not studied.

Holotype (sex not determined), (US 66337), Guam, S. Mariana Is., June 1945, J. R. Stuntz.

DISTRIBUTION: S. Mariana Is. (Guam).

HOST: Not known.

Only a single specimen of this interesting species is available.

Genus **Rodolia** Mulsant

Rodolia Mulsant, 1850, Spec. Trim. Sécurip., 902 (type: *R. ruficollis* Mulsant,

type by subsequent designation of Crotch, 1874; Bengal, India).—Kapur, 1949, Bull. Ent. Research **39**: 531-538, figs.; 1951, Indian Mus., Rec. **38** (2) :1-7, figs.

Body oval to nearly circular, moderately convex, pubescent. Antenna 8-segmented, basal segment broadly lobed, second segment globose, third cylindrical and about twice as long as wide, fourth and fifth progressively shorter and each wider apically than the preceding, sixth to eighth forming a lax club, eighth rounded at apex. Terminal segment of maxillary palp broadly securiform, that of labial palp short and cylindrical. Mandible with subapical tooth remote from apex. Prosternum not produced anteriorly, prosternal carinae high and acute converging anteriorly and connected at anterior margin of prosternum by a transverse carina. Abdomen with six visible sternites. Coxal arc on first visible sternite complete, rarely reaching beyond middle of length of sternite. Legs short, femora stout, tibiae flattened, broad and conspicuously but bluntly angulate externally, with shallow grooves for reception of tarsi, tibial spurs absent. Tarsus 3-segmented. Claws sexually dimorphic, split (male) or with a broad basal tooth (female). Epipleura concave, strongly descending externally, without well-defined cavities to receive tips of femora. Male: aedeagus symmetrical; female: receptaculum with neither nodulus nor ramus developed, cornu flask-shaped, elongate or compact, infundibulum absent, sperm duct long, hemisternites elongate triangular, together forming an ovipositor.

A small genus of the Indo-Australian region, one species of which has been widely introduced for the control of scales. Of the three species which have been introduced into Micronesia at various times, one, *R. pumila* Weise, has

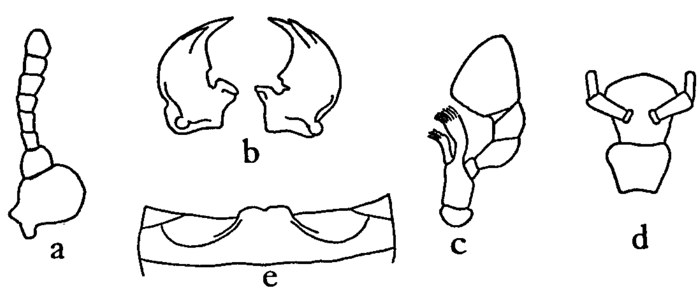


FIGURE 36.—*Rodolia pumila:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite.

been very successful and it is well established more or less throughout the area. The present status in Micronesia of the other two introductions is not clear. *R. cardinalis* (Mulsant), introduced from Hawaii on Guam in 1926, was recovered on that island as late as 1945 but from no other island. *R. breviuscula* Weise was introduced from Bangalore, India on Guam and Majuro in 1948, but no recoveries have been made in recent years and the species has probably died out.

Because of the uncertainty noted above, the three species are included in the following key.

1. Upper parts deep red, except head, basal margin of pronotum broadly, scutellum, and markings on elytra, which are black..........................**33. R. cardinalis**
   Upper parts uniform reddish to yellowish brown...**2**
2. Emargination of sixth sternite of male very broad and shallow, median lobe of aedeagus acutely triangular..**35. R. pumila**
   Emargination of sixth sternite of male subtriangular, about as deep as broad, median lobe of aedeagus slightly widened near apical third and subacute at apex ....**34. R. breviuscula**

33. Rodolia cardinalis (Mulsant) (fig. 37).

Vedalia cardinalis Mulsant, 1850, Spec. Trim. Sécurip., 906.

Novius cardinalis (Mulsant), Crotch, 1874, Revis. Coccinellidae, 283.—Blackburn, 1890, Roy. Soc. S. Australia, Trans. **12** :148.

Eurodolia cardinalis (Mulsant), Weise, 1895, Soc. Ent. Belgique, Ann. **39**: 150; 1916, Arkiv Zool. **10** (20) : 50.

Rodolia (Macronovius) cardinalis (Mulsant), Weise, 1905, Deutsche ent. Zeitschr. **1905**: 220.

Macronovius cardinalis (Mulsant), Weise, 1922, Wiener ent. Zeitung **39**: 104.

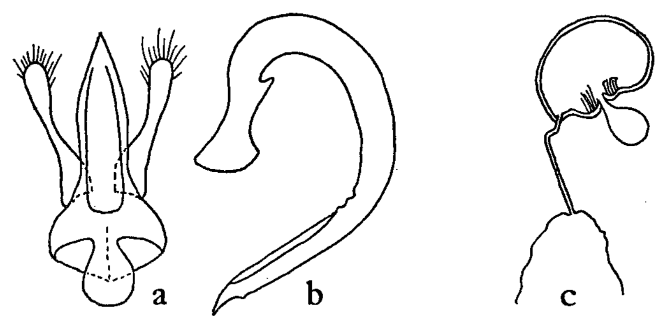


FIGURE 37.—*Rodolia cardinalis:* **a**, tegmen; **b**, sipho; **c**, receptaculum seminis.

Length: 2.6-4.0 mm. Broadly oval, blood red, with head, a broad basal bar along posterior margin of pronotum, scutellum, and markings on elytra, black. Elytral markings: a lunule partially enclosing humeral callus, a sutural stripe, strongly widened at basal third and feebly widened at apical third; a marginal stripe commencing at middle of length and joining sutural stripe at apex; a pair of spots, arranged transversely slightly postmedian, the outer of which is joined broadly with marginal stripe and narrowly with second (internal) spot. Punctation extremely fine, dense, and evenly distributed. Underparts of mesothorax and metathorax black, sternites one to four blackened across median portion; femora black, tibiae and tarsi red. Genitalia as figured.

DISTRIBUTION: More or less worldwide, this species having been introduced into various regions as a beneficial insect. Specimens seen: 4.

S. MARIANA IS. GUAM: Pt. Oca, Pt. Ritidian, Jan., June, Aug. Dec. 1926-1945, G. Bohart, R. Bohart, Gressitt.

HOST: *Icerya* spp. and related scales.

It is evident from the synonymy quoted above that *R. cardinalis* (Mulsant) is an aberrant species of this genus, if indeed it actually belongs here. Its oval form and, especially, the male genitalia suggest a different phylogenetic origin from that of the subcircular species with male genitalia conforming to a different type. It is unfortunate that nothing is published as to the genitalia of *Eurodolia severini* Weise, the type of *Eurodolia*. Weise, who certainly is the outstanding student of this family of beetles since Mulsant, obviously was puzzled as to the relationships in the group. In 1895 and 1916, he used the name *Eurodolia* for this species while in 1905 and 1922 he placed the species under *Macronovius*. The body form of *R. limbata* (Motschulsky) (the type of *Macronovius*) does suggest *R. cardinalis* but here the similarity stops. The genitalia of *R. limbata* are quite conformable with the subcircular species of *Rodolia*. The sipho is long and attenuate, the trabes is not short and stout as in *R. cardinalis* and the median lobe bears a retrorse hooked process at its tip as in *R. fumida* Mulsant and *R. andamanica* Weise as figured by Kapur. On the other hand, the genitalia of *R. minima* Kapur bears a surprising resemblance to that of *R. cardinalis*. With lack of knowledge of the anatomy of *E. severini*, it seems best to leave *cardinalis* in *Rodolia* as a marginal species.

34. **Rodolia breviuscula** Weise (fig. 38, *a-c*).

Rodolia breviuscula Weise, 1892, Soc. Ent. Belgique, Ann. **36**: 26.—Kapur, 1949, Bull. Ent. Research **39**: 533.—Beardsley, 1955, Hawaiian Ent. Soc., Proc. **15**: 397.

Length: 3.25-4.0 mm. Subcircular, convex, reddish testaceous above and below, mesosterna and metasterna somewhat darker, densely and evenly pubescent with fine suberect yellowish hairs, punctation close, very fine, and almost obsolete. Genitalia as figured.

DISTRIBUTION: South India, Micronesia?

S. MARIANA IS. GUAM: 12 specimens of this species, sent from Bangalore, India, were released in 1948; no known recoveries to date.

MARSHALL IS. MAJURO: Unknown number of specimens released on Majuro I. and Uliga I. in 1948; no known recoveries to date.

HOSTS: *Icerya* spp. and related scales.

35. **Rodolia pumila** Weise (figs. 36; 38, *d-f*).

Rodolia pumila Weise, 1892, Soc. Ent. Belgique, Ann. **36**: 26.—Pemberton, 1948, Hawaiian Ent. Soc., Proc. **13**: 208-209.—Beardsley, 1955, loc. cit. **15**: 396.

Length: 3.0-3.6 mm. Similar to *R. breviuscula* Weise but averaging slightly smaller. Reddish to yellowish brown above, mesosterna and metasterna varying from slightly infuscate to rather deep piceous, hind femora usually piceous in basal two-thirds. Pubescence as in *R. breviuscula*, punctation obsolete. Genitalia as figured.

DISTRIBUTION: Hongkong, China, Taiwan, Micronesia. Specimens seen: 83.

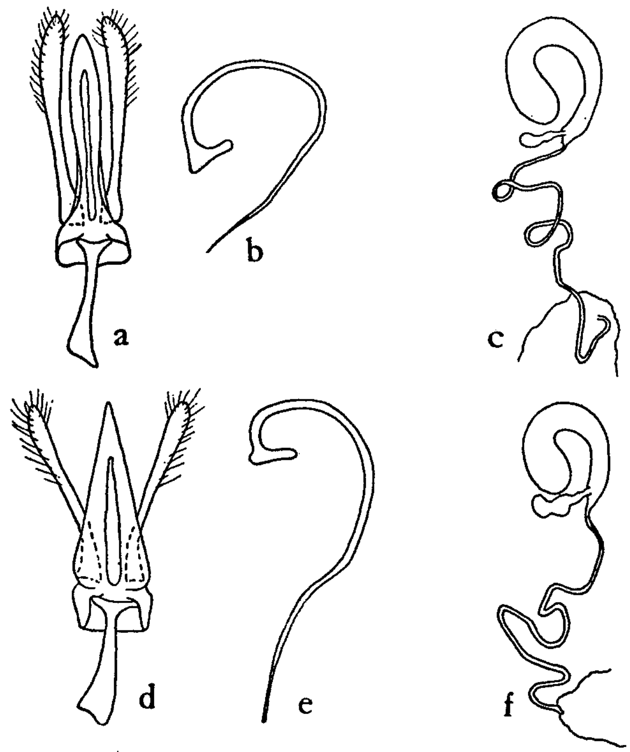


FIGURE 38.—**a-c,** *Rodolia breviuscula: a,* tegmen; *b,* sipho; *c,* receptaculum seminis. **d-f,** *R. pumila: d,* tegmen; *e,* sipho; *f,* receptaculum seminis.

BONIN IS. CHICHI JIMA: July 1949, Mead.

S. MARIANA IS. SAIPAN, TINIAN, ROTA, GUAM, Cocos I.: Jan., Mar.-July, Oct.-Nov. 1937-1954, Beardsley, Dybas, Esaki, Langford, Maehler, Matusita, Oakley.

PALAU. BABELTHUAP, KAYANGEL, KOROR, NGURUKDABEL, ULEBSEHEL, MALAKAL, NGERKABESANG, PELELIU, ANGAUR: Feb.-May, July-Aug., Oct.-Dec., 1936-1957, Beardsley, Dybas, Esaki, Gressitt, Hagen, Langford, McDaniel, Sabrosky.

YAP. YAP: Apr., Dec., 1952-1954, Beardsley, Gressitt.

CAROLINE ATOLLS. NOMWIN A.: Fananu I., Dec. 1954, Smith.

TRUK. TOL, WENA (Moen), PIS, NAMA: Feb.-Mar., Dec. 1949-1954, Beardsley, Gressitt, Langford, Potts.

PONAPE. June-Sept. 1950, Adams.

MARSHALL IS. KWAJALEIN: June 1958, Owen.

HOSTS: *Icerya* spp. and related scales.

Genus **Telsimia** Casey

Telsimia Casey, 1899, New York Ent. Soc., Jour. **7**: 109, 165.—Chapin, 1926, Biol. Soc. Washington, Proc. **39**: 129 (type: *Telsimia tetrastica* Casey, type by subsequent designation of Chapin).

Lipernes Blackburn, 1889, Roy. Soc. S. Australia, Trans. 11:212 (not *Lipernes* Waterhouse).

Notolipernes Blackburn, 1900, loc. cit. **24**: 68 (new name for *Lipernes* Blackburn, unnecessary).

Body oval, moderately convex, finely pubescent. Antenna 7-segmented, first segment strongly inflated, second to fourth short, fifth steeply oblique at apex, sixth wider than long, seventh longer than wide; first, fifth, and seventh with one or more strong setae. Terminal segment of maxillary palp cylindrical, obliquely truncate, of labial palp slender, cylindro-acuminate. Mandible with subapical tooth remote from apex. Prosternum not produced anteriorly, carinae absent, the prosternal lobe quadrate and flat between coxae, mesosternum transverse anteriorly, metasternum same. Abdomen with six visible sternites. Coxal arc on first abdominal sternite incomplete, curving toward and then away from posterior margin of sternite and ending near lateral margin, enclosed area without oblique ridge. Tibial spurs absent. Tarsus 3-segmented. Claw with a broad, almost quadrate, basal tooth. Elytral epipleura flat, narrow, lightly excavate to receive tips of femora. Male: aedeagus symmetrical but of extraordinary type; female: receptaculum and other parts of internal genitalia not sclerotized or pigmented, hemisternites elongate triangular, the pair serving as an ovipositor.

A small genus containing species from southern Africa, Asiatic mainland, Australia, and adjacent islands. Four species are in the present collections from Micronesia. These may be separated by the following key.

1. Elytra uniformly piceous black, punctation very fine and dense; distance between eyes greater than transverse diameter of eye in both sexes (fig. 39, *f-h*) .... **36. nitida**
   Elytra bicolored or entirely pale 2
2. Basal half of elytra shining piceous black; apical half with a large roundish yellowish-brown spot reaching lateral margin but failing to reach suture or apex; eyes in male very large and almost contiguous, in female separated by a distance equal to transverse diameter of eye (fig. 40, *d-f*) .... **39. megalops**
   Basal half of elytra not uniform piceous black 3
3. Elytra pale yellowish brown with a large lozenge-shaped spot common to the two, covering area bounded by scutellum, by points on lateral margins just before middle, and by a point on suture at apical third; eyes in male separated by two-fifths transverse diameter of eye, in female by four-fifths of that distance (fig. 40, *a-c*) .... **38. ephippiger**
   Elytra piceous black with basal and lateral margins finely edged with yellowish brown, with apical fourth indeterminately paler; or entirely pale yellowish brown (teneral?); eyes as in *nitida* .... **37. yapensis**

36. **Telsimia nitida** Chapin (fig. 39).

Telsimia nitida Chapin, 1926, Biol. Soc. Washington, Proc. **39**: 130, 131 (Guam; type in U. S. Nat. Mus., no. 40133).

Length: 1.4-1.9 mm. Punctation fine and dense, even finer toward lateral margins of elytra. Pubescence fine, short and suberect, that on the front of head of male mostly

between the eyes, dense, depressed, and with a golden sheen. Pronotum finely margined across base, lateral margins slightly reflexed. Elytral epipleura flat, excavate for reception of tips of second and third femora, gradually narrowed to apical angle. Legs short and stout, femora, especially the third, somewhat inflated, tibiae not angulate on outer margin. Male genitalia as figured.

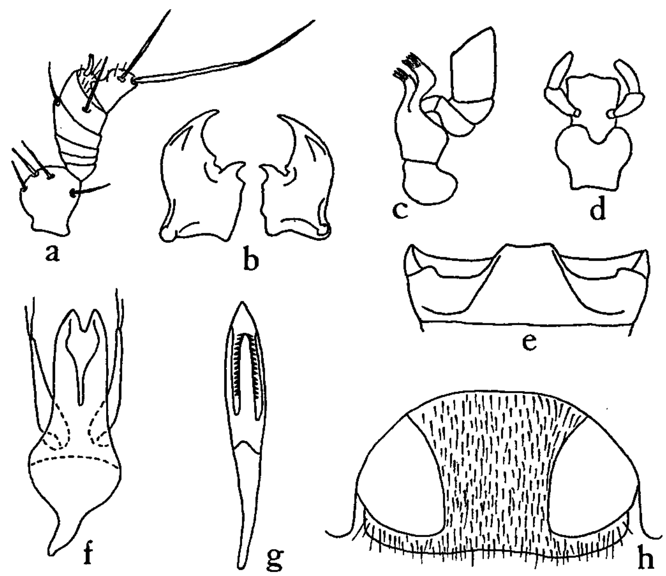


FIGURE 39.—*Telsimia nitida:* **a,** antenna; b, mandibles; **c,** maxilla; **d,** ligula; **e,** first abdominal sternite; **f,** tegmen; **g,** sipho; **h,** front view, head of male.

DISTRIBUTION: Micronesia. Specimens seen: 312.

BONIN IS. CHICHI JIMA: July 1951, R. Bohart.

N. MARIANA IS. PAGAN: Apr. 1940, Yasumatsu and Yoshimura.

S. MARIANA IS. SAIPAN, TINIAN, AGIGUAN, ROTA, GUAM: Jan.-Aug., Dec. 1911-1952, G. Bohart, Bryan, Dybas, Esaki, Gressitt, Hagen, Kondo, Krauss, Langford, Maehler, Oakley, Peterson, Swezey, Townes, Usinger.

PALAU. KOROR: Jan.-Mar., May, Oct., Dec. 1953-1954, Beardsley; Malakal I., on *Aspidiotus destructor* on soursop, Jan. 27, 1964, J. A. Tenorio.

YAP. YAP: July-Aug., Oct. 1950-1952, Goss, Krauss.

CAROLINE ATOLLS. FAIS: Apr. 1954, Beardsley.

TRUK. WENA (Moen): Feb.-Mar., 1949-1954, Beardsley, Potts; Pis I., Feb., June, 1946-1954, Beardsley, Townes.

PONAPE. Nov. 1953, Beardsley.

MARSHALL IS. KWAJALEIN: Mar., Aug. 1946-1952, Fosberg, Oakley.

HOSTS: *Aspidiotus destructor* on coconut; *Pinnaspis buxi* on *Monstera.*

37. **Telsimia yapensis** Chapin, n. sp.

Length: 1.40-1.55 mm. Punctation relatively coarse and dense on elytra, uniform, much finer on head and pronotum. Pubescence fine, short, and suberect, that on front of head of male more dense and with a golden sheen. Pronotum not margined across base, lateral margin very finely reflexed. Elytral epipleura moderately wide, narrowing from excavation for third femur and ending at about apical third. Legs as in *T. nitida*. Genitalia not studied.

Holotype, male (US 66338), Gagil I., Yap Is., July 14, 1946, Oakley. Two paratypes: same data as holotype.

DISTRIBUTION: Western Caroline Is. (Yap). Specimens seen: 3.

HOST: Not recorded.

38. **Telsimia ephippiger** Chapin, n. sp. (fig. 40, *a-c*).

Length: 1.30-1.53 mm. Punctation moderately coarse, dense, and uniform except on head and sides of pronotum, where it is finer and slightly sparser. Pubescence very fine, short, and suberect, that on front of head of male not conspicuous. Pronotum margined across base, lateral margins slightly reflexed. Elytral epipleura as in *T. yapensis*, narrowing from excavation for third femur and ending at about apical fifth. Legs as in *T. nitida*. Male genitalia as figured.

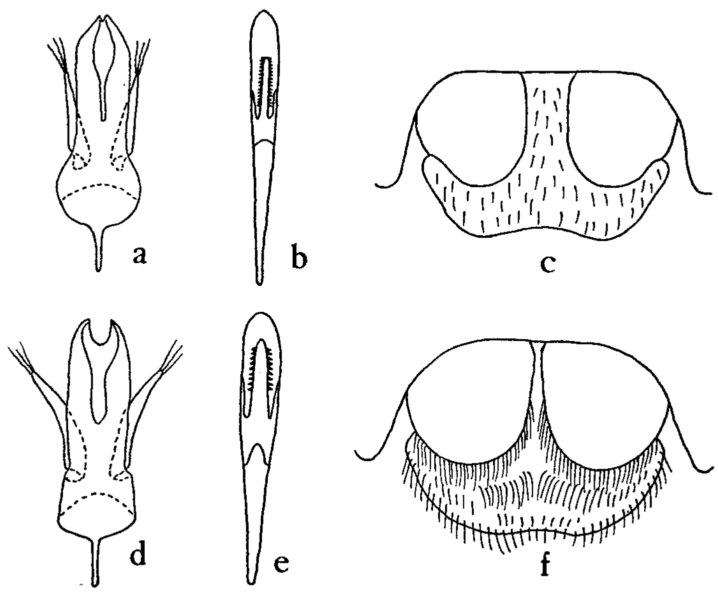


FIGURE 40.—**a-c**, *Telsimia ephippiger: a,* tegmen; *b,* sipho; *c,* front view, head of male. **d-f**, *T. megalops: d,* tegmen; *e,* sipho; *f,* front view, head of male.

Holotype, male (US 66339), limestone ridge, 40 m. alt., Koror I., Palau Is., Dec. 14, 1952, Gressitt. Paratypes (CM, US, BISHOP) 22: five with same data as holotype; limestone ridge, N. of inlet, Jan. 1948, Dybas; same,

S. of inlet, Feb. 1948, Dybas; Babelthuap I., Ngaremeskang, 25 m. alt., Dec. 1952, Gressitt; E. Ngatpang, 65 m. alt., Dec. 1952, Gressitt; Auluptagel I., Sept. 1952, Krauss; NW Auluptagel I., 25 m. alt., Dec. 1952, Gressitt; Ulebsehel (Aurapushekaru) I., Jan. 1948, Dybas; Ngiramaous I., Nov. 1947, Dybas.

DISTRIBUTION: Western Caroline Is. (Palau). Specimens seen: 23.
HOST: Not recorded, sweeping vegetation.

39. Telsimia megalops Chapin, n. sp. (fig. 40, *d-f*).

Length: 1.40-1.55 mm. Punctation moderately coarse, moderately dense and uniform on elytra, much finer on head and pronotum. Pubescence fine, short, and suberect, that on front of head of male very dense and depressed, with a golden sheen. Pronotum margined across base, lateral margins very narrowly reflexed. Elytral epipleura black, continued almost to apices. Femora less stout than in preceding species. Male genitalia as figured.

Holotype, male (US 66340), limestone ridge, 40 m. alt., Koror I., Palau Is., Dec. 14, 1952, Gressitt. Paratypes (CM, US, BISHOP) 15: Koror, Jan., Mar. 1954, Beardsley; Babelthuap I., E. Ngatpang, 65 m. alt., Dec. 1952, Gressitt; near Ulimang, Dec. 1947, Dybas; Auluptagel I., Sept. 1952, Krauss.

DISTRIBUTION: Western Caroline Is. (Palau). Specimens seen: 16.
HOST: Not recorded, at light trap, and sweeping vegetation.

Genus **Sticholotis** Crotch

Sticholotis Crotch, 1874, Revis. Coccinellidae, 200.—Weise, 1908, Fauna Süd-West-Australia 2:13 (Type: *Sticholotis substriatus* Crotch, type by original designation; Japan).

Gymnoscymnus Blackburn, 1892, Roy. Soc. S. Australia, Trans. 2: 13 (type: *Gymnoscymnus quadrimaculatus* Blackburn, monobasic; Australia).

Body nearly circular, strongly convex, glabrous, lateral margins of elytra narrowly explanate. Antenna 11-segmented, basal segment stout, bent at basal third, twice as long as broad, second segment two-thirds as long as basal, of equal width, barrel-shaped, third through eighth segments cylindrical, third three-fourths as long as second, fifth a little longer than fourth, sixth to eighth subequal, ninth to eleventh forming a compact, oval club, each longer than the preceding one. Terminal segment of maxillary palp slender, strongly acuminate in apical half, three times as long as its greatest diameter, that of labial palp cylindro-acuminate, rounded at apex. Mandibles unusually long, subapical tooth remote from apex. Prosternum not produced anteriorly, prosternal lobe broad, flat, without carinae. Abdomen with five visible sternites. Coxal arc incomplete, approaching posterior margin of sternite which it follows nearly to lateral margin. Femora stout, tibiae not angulate. Tibial spurs absent. Tarsus 4-segmented. Claw slightly thickened in basal half. Elytral epipleura nearly flat, continuous to apex, slightly impressed for reception of tips of second and third femora. Male: aedeagus symmetrical; female: not studied.

A small genus of the Asiatic mainland from India to China, the neighboring islands, and Australia. One species has been taken on Guam, probably introduced from Malaya.

40. Sticholotis ruficeps Weise (fig. 41).

Sticholotis ruficeps Weise, 1902, Term. Füzetek **25**: 511 (Kuala Lumpur, Singapore).— Bielawski, 1960, Annales Zoologici (Warsaw) **1**: 449, figs. 20, 23-26. (Kuala Lumpur specimen selected as lectotype, in Museum of Natural History, Budapest.)

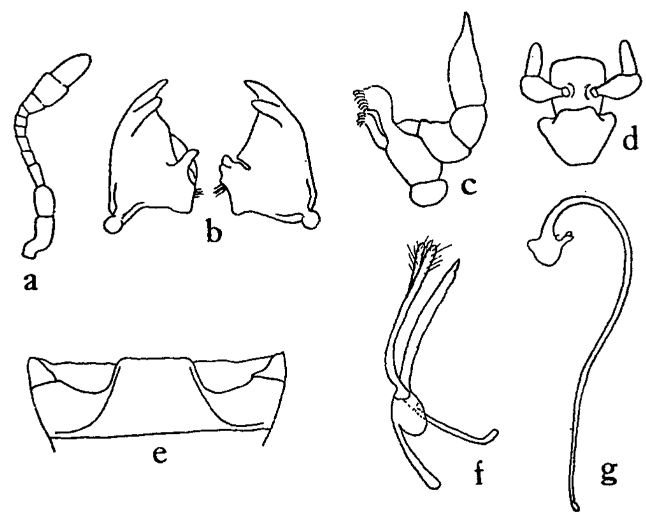


FIGURE 41.—*Sticholotis ruficeps:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite; **f**, tegmen; **g**, sipho.

Length: 2 mm. Under parts dark castaneous, legs yellowish brown. Upper surface piceous black, anterior angles of pronotum slightly lighter, elytra with very narrowly reflexed margins which, together with a postmedian circular spot and a transverse bar on basal fourth touching the callus on either side, are reddish yellow. Head castaneous, with small and prominent eyes, finely and rather densely punctate, punctation of pronotum slightly coarser, that of elytra still more coarse. Median portion of metasternum rather coarsely and subrugosely punctate. Abdominal sternites shining, finely and sparsely punctate. Aedeagus as figured.

DISTRIBUTION: Malaya, S. China, Mariana Is. Specimens seen: 17.

S. MARIANA IS. GUAM: 1 m. SE of Asan, Fadang; Oca Point, Sinajana, Amantes Point, Harmer Field, Jan., May-July, Sept., Nov. 1938-1949, Baker, G. Bohart, Dybas, Gressitt, Oakley. SAIPAN: Sept. 1956, McDaniel.

HOST: Not recorded; one specimen recorded as found on coconut.

Genus **Azya** Mulsant

Azya Mulsant, 1850, Spec. Trim. Sécurip., 928.—Crotch, 1874, Revis. Coccinellidae, 279. (Type: *Azya luteipes* Mulsant, type by subsequent designation of Crotch, 1874.)

Body nearly circular, strongly convex, upper surface densely set with fine, short pubescence. Antenna 11-segmented, basal segment stout, 1.5 times as long as broad, second segment barrel-shaped, as long as broad, third shorter than second or fourth, fifth through eighth similar and each wider than fourth, ninth and tenth similar, each produced laterally in a triangular lobe which bears at its outer apical angle a small papilla, eleventh longer than tenth, wider toward apex. Terminal segment of maxillary palp with sides parallel, apex strongly oblique; that of labial palp subcylindrical, slightly tapering to truncate apex. Mandible with subapical tooth. Prosternum not produced anteriorly, deeply excavate at sides for reception of antennae, prosternal lobe elevated between anterior coxae, not carinate. Abdomen with five visible sternites. Coxal arc incomplete, not reaching apical or lateral margins of sternite. Tibiae strongly angulate; tibial spurs absent. Tarsus 4-segmented; claw with basal triangular tooth. Elytral epipleura concave, strongly descending externally, foveolate for reception of tips of second and third femora. Male: aedeagus symmetrical; female: receptaculum seminis without development of ramus or nodulus, infundibulum absent, hemisternites elongate triangular, together forming an ovipositor.

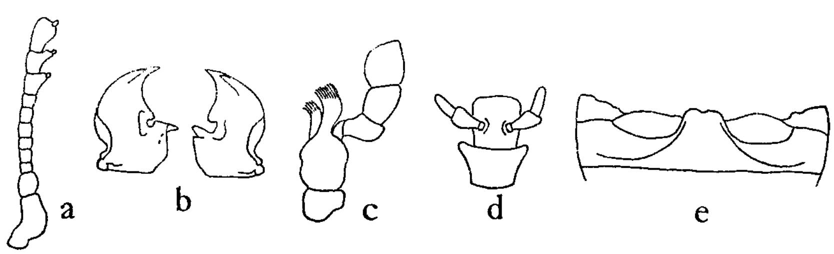


FIGURE 42.—*Azya pontbrianti:* **a,** antenna; **b,** mandibles; **c,** maxilla; **d,** ligula; **e,** first abdominal sternite.

A small genus of the New World, distributed from Mexico through Central America to Argentina. Two species have been introduced into Micronesia.

KEY TO MICRONESIAN SPECIES OF AZYA

Pubescence of pronotum and elytra uniformly ashy gray..................................**41. trinitatis**
Pubescence of elytra ashy gray and black, the black hairs concentrated in a roundish discal spot..**42. orbigera**

40. Azya trinitatis Marshall (fig. 43, *a-c*).

Azya trinitatis Marshall, 1912, Ann. Mag. Nat. Hist. VIII, **10**: 320, fig. 1 (Trinidad, B.W.I.).

Length: 2.0-2.5 mm. Underparts and legs light yellow brown, the mesosterna and metasterna slightly infuscate. Upper surface uniformly black with bluish reflections, punctation uniform, very fine and very dense. Metasternum coarsely but discretely

punctured laterally in male, coarsely rugose laterally in female, median portion in both sexes finely and sparsely punctured. Abdominal sternites, especially the fifth, finely and densely punctured. Fifth sternite of male at middle of apical margin just perceptibly emarginate, that of female rounded. Genitalia as figured.

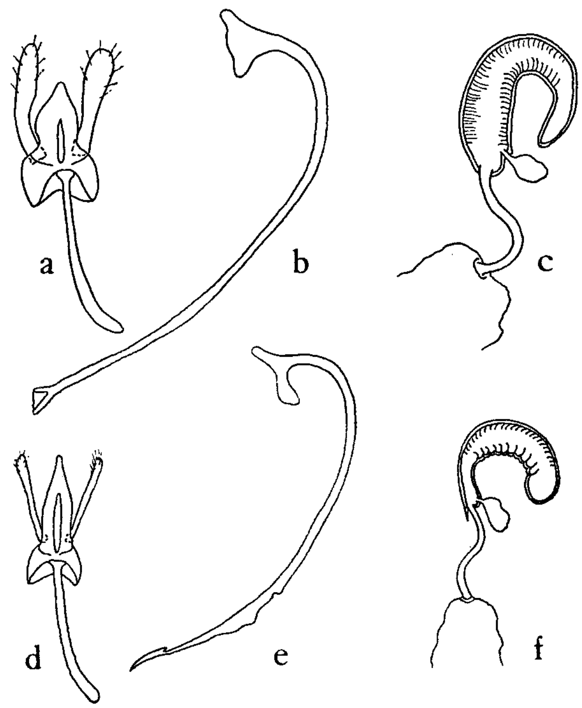


FIGURE 43.—**a-c**, *Azya trinitatis: a,* tegmen; *b,* sipho; *c,* receptaculum seminis. **d-f**, *A. orbigera: d,* tegmen; *e,* sipho; *f,* receptaculum seminis.

DISTRIBUTION: Northern South America and Trinidad, B.W.I., introduced to Puerto Rico, St. Croix, Virgin Is., and Saipan, Mariana Is.

S. MARIANA IS. SAIPAN: Introduced in 1960.

HOST: Not recorded.

It is too early to know whether this introduction will be successful.

41. Azya orbigera Mulsant (fig. 43, *d-f*).

Azya orbigera Mulsant, 1850, Spec. Trim. Sécurip., 930.

Azya luteipes Mulsant, Gorham, 1895, Biol. Centr. Am. **7**:211, fig. 24 (part).

Length: 3.0-3.8 mm. Underparts of thorax piceous black, of abdomen, and legs reddish yellow. Head of male reddish yellow, of female bluish black. Pronotum and elytra bluish black, punctation of pronotum very fine and dense, of elytra obsolete. Pubescence very fine, uniform in color on pronotum, bicolored on elytra. The black

pubescence forms a single, large, nearly circular spot on each elytron. The distance between the spots is about one-third the transverse diameter of a spot. Metasternum rugose laterally, very finely punctured medianly, abdominal sternites uniformly evenly and finely punctured. Fifth sternite in both sexes rounded. Genitalia as figured.

DISTRIBUTION: Mexico to northern South America, introduced on Guam. Specimens seen: 6.

S. MARIANA IS. GUAM: Agana, Merizo, Yona, Mar.-Apr., Sept. 1936-1946, Krauss, Oakley, Swezey.

HOST: Not recorded.

This introduction appears to have been successful as the species has been taken over a 10-year period.

Genus **Cryptognatha** Mulsant

Cryptognatha Mulsant, 1850, Spec. Trim. Sécurip., 497 (type: *Cryptognatha auriculata* Mulsant, type by subsequent designation of Crotch, 1874).

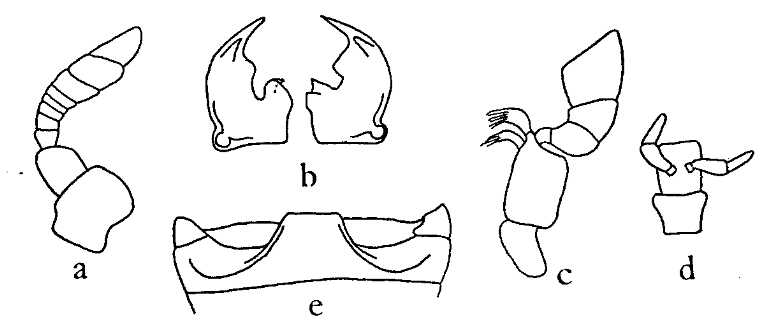


FIGURE 44.—*Cryptognatha auriculata:* **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite.

Body subcircular, strongly convex, upper surface glabrous. Antenna 10-segmented, basal segment stout, laterally strongly lobed, second segment barrel-shaped, about half as long as basal, third segment half as long as second, very narrow at base and twice as wide at apex as at base, fourth through seventh segments progressively shorter and broader so that the seventh is more than twice as broad as long, eighth and ninth segments slightly broader than long, and together nearly as long as third through seventh combined, tenth segment narrower than ninth, and half again as long, its apex oblique. Terminal segment of maxillary palp subsecuriform; that of labial palp slender cylindrical, slightly tapering to truncate apex. Mandible with lateral tooth remote from apex. Prosternum strongly produced anteriorly, completely covering mouth parts and antennae when head is in repose, not notched for antennae; prosternal lobe broad, with feeble carinae. Abdomen with five visible sternites. Coxal arc following closely the posterior margin of coxal cavity, nearly complete. Tibial spurs absent. Anterior tibia laterally with a broad, winglike expansion. Tarsus 4-segmented; claw simple but slightly thickened at base. Elytral epipleura moderately broad, strongly concave, deeply excavate for reception of tips of femora. Male: Aedeagus symmetrical; female: recep-

taculum seminis without developed nodulus or ramus, cornu curved, tapering from thick base to subacute apex; sperm duct several times as long as receptaculum; infundibulum absent; hemisternites elongate triangular, forming an ovipositor.

A small genus of Central and northern South America, one species of which has recently been introduced into the Mariana Islands.

43. **Cryptognatha nodiceps** Marshall.

Cryptognatha nodiceps Marshall, 1912, Ann. Mag. Nat. Hist. VIII, **10**: 321, fig. 2 (Trinidad, B.W.I.).

"Pale yellow or reddish yellow, with a large irregular piceous black patch occupying nearly the whole disc of each elytron, and an elongate longitudinal spot close to the suture before the middle. Head of ♂ broadly impressed, with a small projecting tubercle close to the inner margin of the eye, the epistome broadly truncate anteriorly, its external angles roundly subrectangular and somewhat recurved; in the ♀ the head is much less deeply impressed and the tubercles are less conspicuous. Pronotum with a fine, transverse, curved, raised line just in front of the scutellum, the entire surface closely and distinctly punctate. Elytra broadest before the middle, the punctation rather less close than on the pronotum; the epipleurae sloping steeply inward and with deep excavations for the anterior pairs of legs. Front tibiae with the exterior border angularly dilated in both sexes (omitted in the figure); tarsal claws simple.

"Length 2.75 mm.

"TRINIDAD: Cedros (C. W. Hewlett, F. W. Urich)."

DISTRIBUTION: Trinidad, British Guiana; introduced into Fiji and Mariana Is.

S. MARIANA IS. SAIPAN: Introduced in 1960.

Genus **Catana** Chapin

Catana Chapin, 1940, Washington Acad. Sci., Jour. **30**: 264, 266.—Kapur, 1956, Indian Mus., Rec. **52**: 189-193, figs. (Type: *Catana clauseni* Chapin, type by original designation).

Body subcircular, moderately convex, upper surface very sparsely hairy. Antenna 8-segmented, first segment stout, second globular, third elongate and slightly wider toward apex, about three times as long as broad, fourth about twice as long as broad or slightly less, fifth to seventh short and subequal, eighth paddle-shaped, longer than third through seventh combined. Terminal segment of maxillary palp longer to much

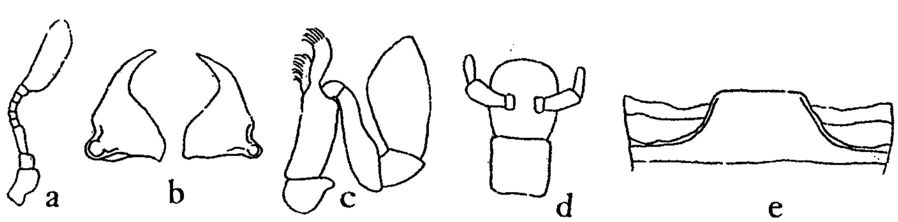


FIGURE 45.—*Catana parcesetosa*: **a**, antenna; **b**, mandibles; **c**, maxilla; **d**, ligula; **e**, first abdominal sternite.

longer than broad, apex obliquely truncate; that of labial palp small, cylindrical, slightly acuminate and truncate. Mandible simple, without lateral tooth. Prosternum strongly produced anteriorly, completely covering mouth parts when head is in repose, lateral portions deeply notched for reception of antennae; carinae absent or present. Abdomen with five visible sternites. Coxal arc following closely posterior margin of coxal cavity, curving outward nearly to lateral margin of sternite. Tibial spurs absent. Tarsus 4-segmented; claw with a broad, squarish, basal tooth. Elytral epipleura moderately concave, deeply excavate for reception of tips of femora, especially of third femur. Male: Aedeagus strongly asymmetrical; female: receptaculum seminis of peculiar shape, not differentiated into ramus, nodulus and cornu, infundibulum not developed. Hemisternites elongate triangular, together forming an ovipositor.

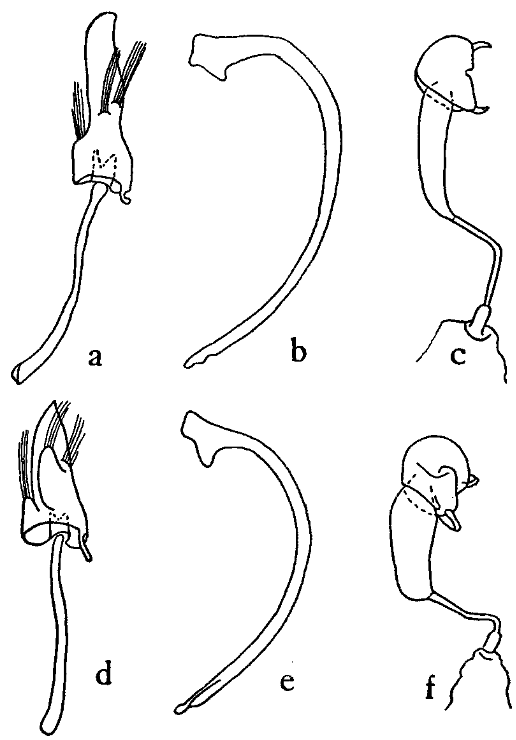


FIGURE 46.—**a-c**, *Catana spilota: a*, tegmen; *b*, sipho; *c*, receptaculum seminis. **d-f**, *C. dimidiata: d*, tegmen; *e*, sipho; *f*, receptaculum seminis.

A small genus related to *Serangium* Blackburn and *Delphastus* Casey.[2]

Species are known from India, Malaya, Sumatra, Philippine Is., and Micronesia. One species has been introduced into the West Indies, apparently successfully.

[2] In my review of the genera related to *Serangium* (1940, Washington Acad. Sci., Jour. **30**:263-272) there is an error which should be corrected. In line 9 from bottom, page 263, three words were omitted in preparing the final typescript for the printer. Line 9 should read "Semichnoodes *Sicard 1909 not* Weise 1892." *Semichnoodes* Weise is a synonym of *Serangium* Blackburn, as had been pointed out.

The two species known from Micronesia may be distinguished in the following manner.

Larger (2.1-2.5 mm.), black, each elytron with an oval reddish-castaneous spot lying longitudinally on disc...**44. spilota**
Smaller (1.6-1.8 mm.), elytra black in basal half, yellowish castaneous in apical half ....**45. dimidiata**

44. Catana spilota (Weise) (fig. 46, *a-c*).

Serangium spilotum Weise, 1913, Philippine Jour. Sci. **8** D: 241 (Luzon, P. I.).

Catana spilota (Weise) Chapin, Washington Acad. Sci., Jour. **30**: 267-268.

Length: 2.1-2.5 mm. Punctation evident but lightly impressed on head and pronotum, virtually obsolete on elytra; pubescence very short and sparse on head, more abundant and longer on pronotum, on elytra restricted to a few stray hairs near basal margin and a single row of hairs following lateral margin. Pronotum finely margined. Scutellum an equilateral triangle. Elytral epipleura moderately wide in basal half, rapidly narrowing in apical half and disappearing shortly before apex. Underparts shining, prosternum finely rugose, mesosternum mostly highly polished. Abdominal sternites sparsely pubescent except fifth which is densely pubescent. Genitalia as figured.

DISTRIBUTION: Philippine Is., Micronesia. Specimens seen: 44.

S. MARIANA IS. GUAM: Agana, Agat, Mt. Alifan, Anderson Air Force Base, Pt. Oca, Piti, Talofofo, April-Sept. 1945-1952, G. Bohart, Gressitt, Krauss, Wallace. TINIAN: Mt. Lasso, June 1946, Townes.

HOST: Not recorded, mostly taken at light.

45. Catana dimidiata Chapin, n. sp. (fig. 46, *d-f*).

Length: 1.6-1.8 mm. Punctation obsolete on head, pronotum, and elytra; pubescence very short and sparse on head, longer but equally sparse on pronotum, on elytra restricted to a few hairs in the scutellar region and the usual row along the lateral margin. Pronotum finely margined except across middle of front. Scutellum as in *C. spilota*. Elytral epipleura moderately concave, rather narrow in basal half and narrowing abruptly just behind the pit for hind leg. Underparts shining, prosternum not noticeably rugose, mesosterna and metasterna not at all rugose, highly polished and glabrouse. Abdominal sternites glabrous except fifth which is rather densely pubescent. Genitalia as figured.

Holotype, male (BISHOP 6119), and four paratypes (US, BISHOP), Koror I., Palau, Mar. 1954, Beardsley; one paratype, same data as holotype except July 1953.

DISTRIBUTION: Caroline Is. (Koror). Specimens seen: 6.

HOSTS: *Aleurocanthos palauensis, Furcaspis oceanica, Xenaleurodes artocarpi.*

APPENDIX

One published record and one small lot of specimens are of such dubious provenance that it seems best to group the following three species as doubtful members of the Micronesian fauna.

46. Halyzia 16-guttata (Linnaeus) (figs. 5; 47).

Coccinella 16-guttata L., 1758, Syst. Nat., Ed. **10**: 367 ("Habitat in Europa").

Halyzia 16-guttata (L.) Mulsant, 1846, Hist. Nat. Coléopt. France, Sécurip., 148.

Halyzia pallasii Mulsant, 1850, Spec. Trim. Sécurip., Appendix, 1025 [type stated to be from "les iles Marianes (Muséum de St. Petersbourg)"].

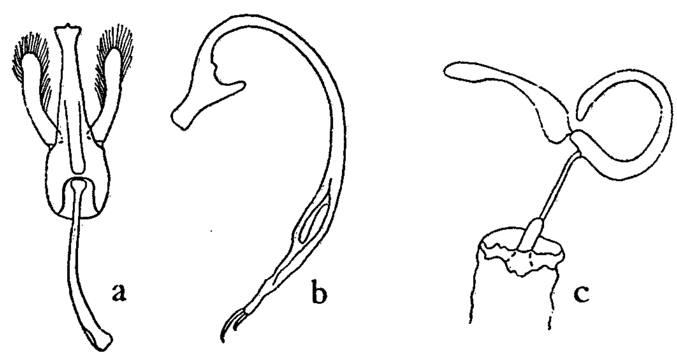


FIGURE 47.—*Halyzia 16-guttata:* **a**, tegmen; **b**, sipho; **c**, receptaculum seminis.

Mulsant's description fits European specimens of *Halyzia 16-guttata* (L.) so perfectly that I have no hesitation in synonymizing the two species. There remains the question—is it likely that *H. 16-guttata* was collected in the Marianas once, sometime before 1850, and not again since that date or is it more likely that the original specimens of *H. pallasii* were mislabeled as to origin? *H. 16-guttata* has been reported as far east as Siberia but not from Japan, the Ryukyus, Taiwan, or the Philippines. I believe that the second possibility, that the specimen or specimens were mislabeled, is the more likely and therefore while the genus *Halyzia* has been included in the key to the genera found in Micronesia, the species name has been removed from Micronesia list of species.

The small lot of specimens mentioned above was received from the U. S. National Museum, labeled as follows: Pt. Oca, Guam/May 1945/G.E. Bohart /J.L. Gressitt. Of the seven species found in the lot, four could properly have been collected on Guam. Three of them, belonging to three different genera, are new records for the island and have not been collected before or since. All of the species are known to be more or less common on Okinawa in the Ryukyu Is., where Bohart collected about two months later. In one case, *Verania dis-*

color (F.), 27 specimens were taken in the course of general collecting. This moderately large and conspicuous species has not otherwise been recorded from Micronesia.

47. Pseudoscymnus kurohime (Miyatake) (fig. 48).

Scymnus (s. str.) *kurohime* Miyatake, 1959, Ehime Univ. Sect. 6 (Agric.), Mem. 4 (2) : 136, figs. 50-60 (Okinawa, type in M. Chûjô collection).

Length: 1.7-2.2 mm. Body form broadly oval; punctation of head fine and dense, that of pronotum similar and uniform, that of elytra somewhat more coarse and slightly less dense; pubescence short, depressed, gray, rather more dense than usual on head, that on elytra slightly swirled from base to apex. Color black, the tibiae, tarsi, mouth parts, antennae, anterior margin narrowly, anterior angles more broadly of pronotum, and apical margin of elytra narrowly brownish. Genitalia as figured.

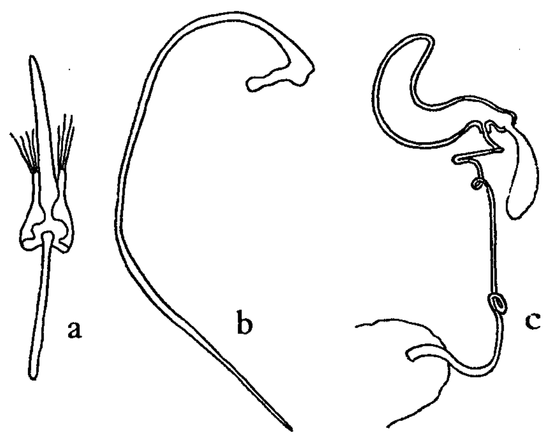


FIGURE 48.—*Pseudoscymnus kurohime:* **a,** tegmen; **b,** sipho; **c,** receptaculum seminis.

DISTRIBUTION: Ryukyu Is., Mariana Is.

S. MARIANA IS. GUAM: two, Pt. Oca, May 1945, Bohart and Gressitt; locality record doubtful, probably from Okinawa, Ryukyu Is.

48. Verania discolor (Fabricius) (fig. 49).

Coccinella discolor Fabricius, 1798, Suppl. Ent. Syst., 77.

Verania discolor (Fabricius) Mulsant, 1850, Spec. Trim. Sécurip., 369.—Crotch, 1874, Revis. Coccinellidae, 176.

Length: 4.0-4.6 mm. Mesosterna and metasterna piceous black; prosternum, epimera, and lateral margins of abdomen pale; head pale; pronotum pale reddish brown with basal margin and two round discal spots piceous; elytra pale reddish brown with periphery piceous, sutural stripe somewhat broader than lateral and basal borders. Scutellum black, minute. Punctation throughout fine and dense, not deeply impressed. Genitalia as figured.

DISTRIBUTION: China, Japan, Ryukyu Is., Java, India, Cambodia.

S. MARIANA IS. 27 specimens of this species are labeled as from Pt. Oca, Guam. However, as has been indicated earlier, some specimens from Okinawa were mistakenly so labeled, and the mistake was discovered after the specimens were sorted.

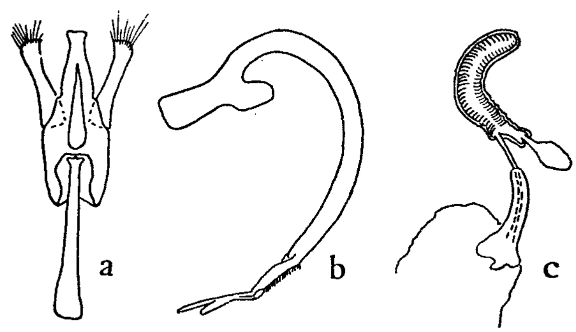


FIGURE 49.—*Verania discolor:* **a**, tegmen; **b**, sipho; **c**, receptaculum seminis.